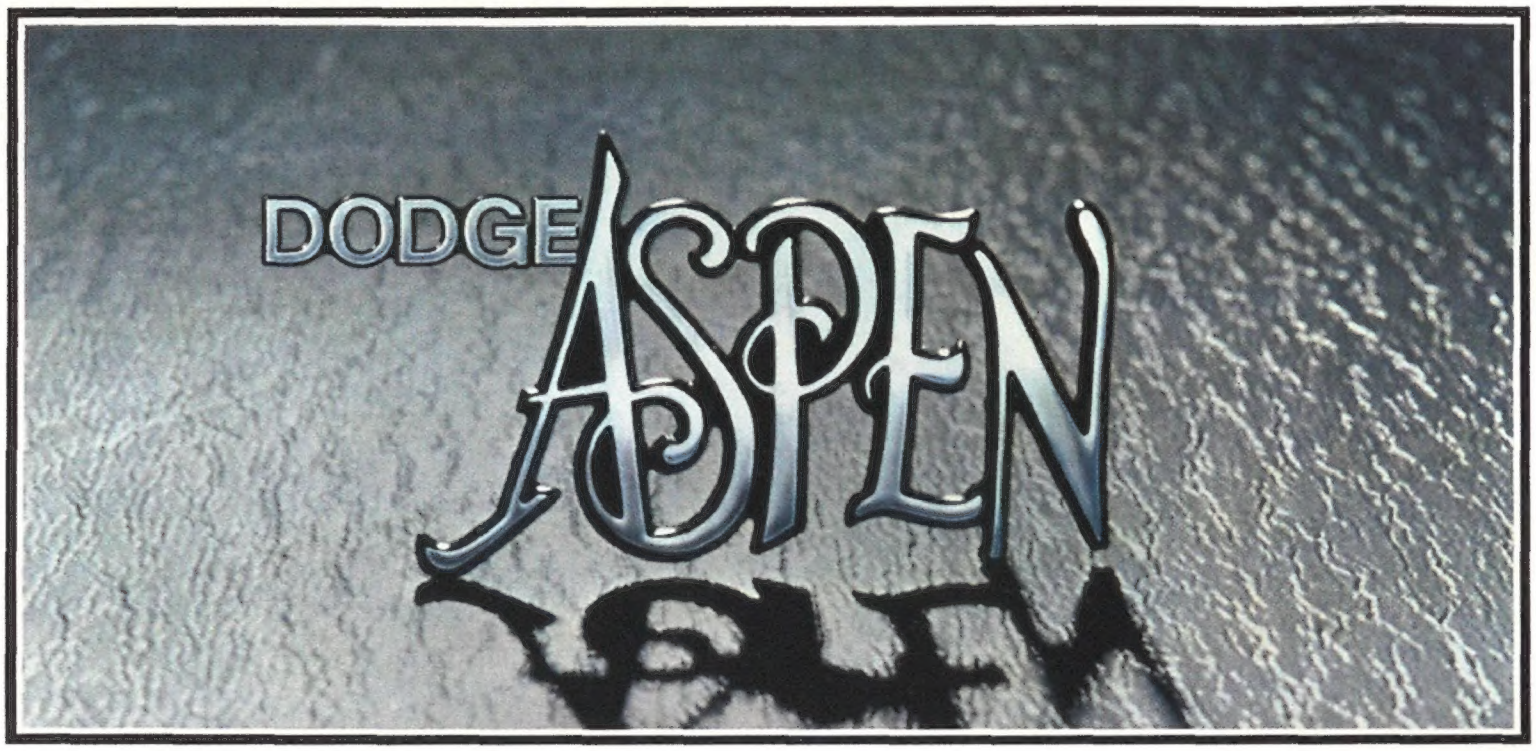
December 1975

Smithsonian

A magnification of beetles,
underestimated ornaments (p. 104)



We took the things you said and engineered them into

This new kind of car was developed for those people who wanted the economy and maneuverability of a small car, but did not want to sacrifice comfort and ride.

It is available in two versions: Dodge Aspen and Plymouth Volaré.

To give you a big-car ride, we invented a new suspension.

This new kind of small car called for a new suspension. So, our engineers invented an Isolated Transverse front suspension (Patent Pending). It's truly unique. Road shock is kept as far away from the driver and passengers as possible.

For greater quiet, we engineered two noise-reducing systems.

Most people take noise for granted in a small car. But not our engineers. They developed two special sound systems. A sealing system that minimizes wind noise and an insulation system that reduces road noise.

Dodge Aspen and Plymouth Volaré are roomier than many larger cars.

We reserved smallness for the outside. Our sedan models offer more total headroom and legroom than many bigger cars. The two-door coupes seat five passengers, comfortably. The four-door and the station wagon models seat six, comfortably.

There was no small-car scrimping on comfort.

Getting in and out of some small cars can be a problem. In these cars, our engineers developed wide door openings that make it easy. There's even an optional seat that gives the driver a greater amount of comfort adjustment than conventional seats, and also in two-door models a pull-strap seat-back release that lets you get in and out of the back seat using only one hand.

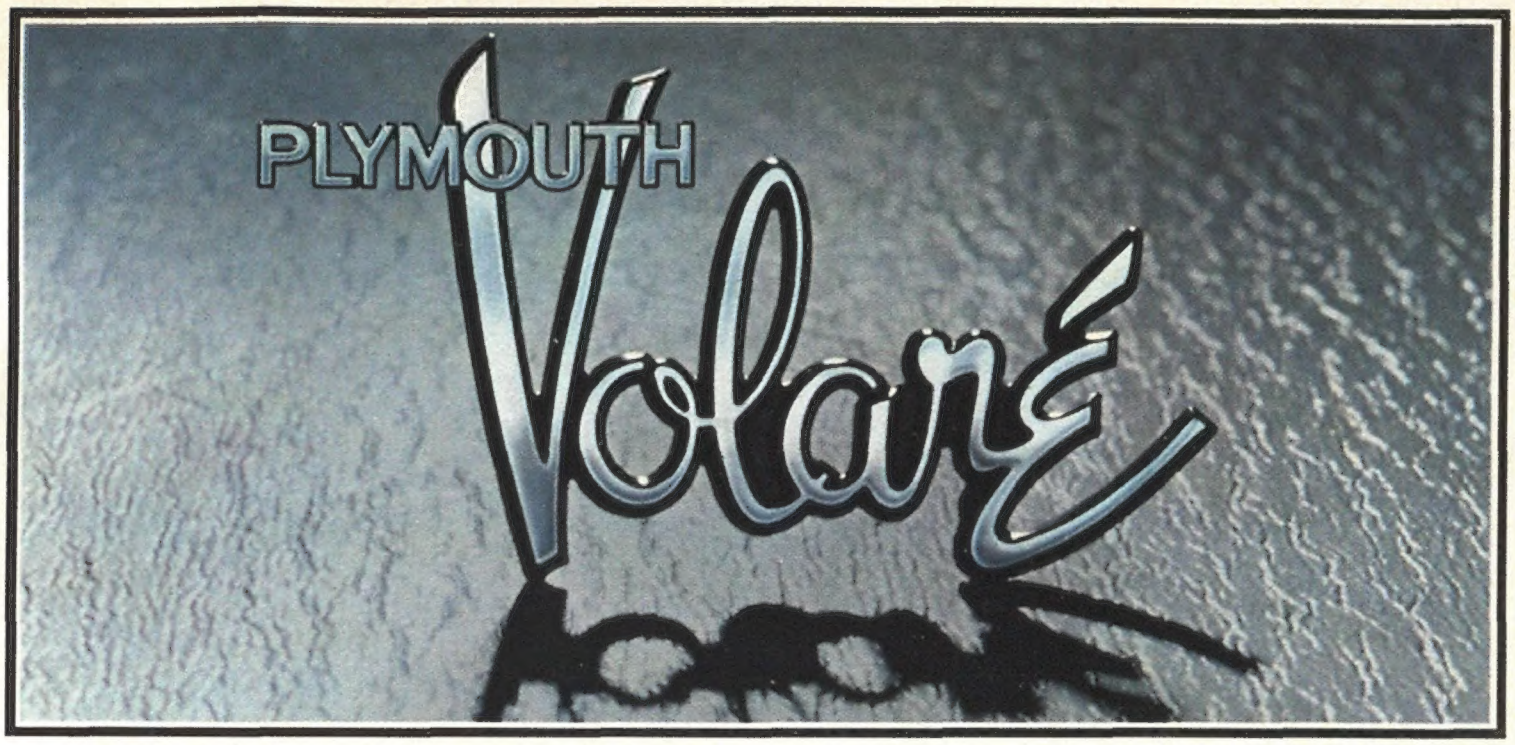
Plymouth Volaré and Dodge Aspen are designed to make it easier to see the road.

We evaluated the relationship between the driver, the steering wheel and the seat to put you in a comfortable position to see the road, and large windows and windshield make it even easier to see.

Aspen and Volaré achieved E.P.A. rated highway mileage of up to 30 m.p.g.

According to official E.P.A. estimated mileage results, Aspen and Volaré with Slant Six engines and manual transmissions got 30 on the highway and 18 in the city with their wagon models, and 27 on the highway and 18 in the city with their coupes and sedans.* We did this by designing the shape to reduce wind friction. Then we reduced weight to about a thousand pounds less than a full-size car. That all helps increase economy. Of course, your actual mileage may differ depending on your driving habits, the condition of your car and optional equipment.

*In California, see your dealer for E.P.A. mileage figures for California equipped cars.



were important in big cars a new kind of small car.

Plymouth Volaré and Dodge Aspen are covered by The Clincher.

This means that for the first 12 months of use, any Chrysler Motors Corporation dealer will fix, without charge for parts or labor, any part of your 1976 Dodge Aspen or Plymouth Volaré we supply (except tires) which proves defective in normal use, **regardless of mileage.** Of course, the owner is responsible for normal maintenance such as changing filters and wiper blades.

With three body styles, your choice is not restricted.

These new small cars are offered as a 2-door coupe, a 4-door sedan and a 4-door station wagon—in several versions. Our new-size wagon weighs up to 1,200 lbs. less than some bigger ones. That means you'll save gas and even though it's two feet shorter than a full-size wagon, you can carry 92% as much weight and up to 76% as much bulk. Compare what you can carry with competitive wagons.

SIZE	LENGTH OVER-ALL	TOTAL LOAD CAP.	CU.FT. CARGO SPACE	PAS-SENGERS
FORD COUNTRY SQUIRE	18.8 ft.	1,200 lbs.	94.6	6
CHEVELLE WAGON	18.0 ft.	1,100 lbs.	85.1	6
OUR NEW WAGON	**16.8 ft.**	**1,100 lbs.**	**71.9**	**6**
PINTO WAGON	14.9 ft.	850 lbs.	57.2	4

They're even easy to service.

We included all of our electronic advances. That means you can forget about replacing points and condensers. And, under normal driving conditions, there is no recommended transmission maintenance.

We wanted you to be able to order the options you wanted.

Many small cars are limited in the number of convenience options you can add. Ours can take all the important ones. For example, air conditioning engineered to provide comfort levels comparable to larger cars, power seats, power windows, electric door locks, tilt steering wheel, 4-speaker stereo, sun roof, power steering, power disc brakes, 50,000-mile battery, Sure-Grip axle, 4-speed manual overdrive transmission.

The price may be the biggest surprise of all.

You will find it hard to believe that you can get so much car, so much value for such a low price.

We made two versions . . . with two names . . . Dodge Aspen and Plymouth Volaré.

Aspen at your Dodge dealer's. Volaré at your Chrysler-Plymouth dealer's. See them now.

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December 1975

Smithsonian

Volume 6, Number 9

Table of Contents

COVER: Four decorative snout beetles from different localities in the South Seas show variety of genus (p. 104)
Photograph by Kjell B. Sandved

6 The view from the castle by Secretary S. Dillon Ripley

10 Phenomena, comment and notes by James K. Page jr.

22 Letters to the Editor

32 Around the Mall and beyond by Edwards Park

40 In the mountain village of Lauscha, German craftsmen fashioned exquisite glass Christmas decorations
By Phillip Snyder

46 Technology exists to create homes—or refit old ones—to be largely self-sufficient for a new way of life
By Sam Love

56 Cartoons still show Uncle Sam as witness to the nation
By Daniel P. Moynihan

64 Charles Carroll of Carrollton risked his fortune to attend the birth of the United States and lived long enough to watch his country move toward maturity
Text by Mary H. Cadwalader
Color photographs by Robert de Gast

74 Michelangelo's last painting, the *Crucifixion of St. Peter,* is a chart of the artist's own spiritual life
Text by Leo Steinberg, photographs by Ronald Sheridan

86 Many have been recovered, but hunt still goes on for original music scores lost during World War II
Text by Carleton Smith, photographs by Ralph Crane

94 Riding freights is no picnic for today's tramps
Text and photographs by Roger Warner

104 Nature's most successful design may be beetles
Text by Michael Emsley, photographs by Kjell B. Sandved

110 A magic ratio recurs throughout art and nature—from the curves of seashells to proportions of the Parthenon
Text by William Hoffer, illustrations by Barbara Alu

126 Book reviews

134 Additional reading

135 Picture credits

138 December events at the Smithsonian

142 Smithsonian tours

144 The postman can blame it on old Horsley
By Patrick Ryan

Millions have already bought an SX-70 Land camera. But which model should *you* buy? Study the features, then see your camera dealer. Whichever you choose, you'll be getting not only a remarkable instrument, but an adventure in picture-taking.

Shopper's Guide to Polaroid's SX-70.

$194.95* **The Original**	**$149.95*** **The Model 2**	**$99.95*** **The Model 3**
Camera ejects picture automatically.	Same	Same
You watch the image develop.	Same	Same
Picture is hard, dry, durable, fade-resistant.	Same	Same
Nothing to peel, nothing to throw away.	Same	Same
Focuses from 10.4 inches to infinity.	Same	Same
Reflex viewing system (through-the-lens focusing).	Same	To focus, you set the distance on the face of the camera.
Precise 4-element lens.	Same	Same
10-shot color film, big prints.	Same	Same
Fresh power every time you load (battery is in the film).	Same	Same
Uses 10-shot FlashBar.	Same	Same
Genuine leather.	Brown Porvair.	Deep tan Porvair.
Folds to about 1″x4″x7″.	Same	Same
Lightweight (24 ounces).	Same	Same
Brushed chrome body.	Off-white plastic body.	Black plastic body.
Automatic time exposures up to 14 seconds.	Same	Same
Automatic film counter.	Same	Same
12,000 RPM motor.	Same	Same
Uses all optional SX-70 attachments.	Same	Will not accept lens shade or close-up lens.

*Suggested list prices. ©1975 Polaroid Corporation. Polaroid ® SX-70.™

Now the American dream doesn't have to become a nightmare.

There could be as many as 20 million of them out there.

They lie rusting on streets and countryside like a pox on the American landscape.

Although they're 85% reusable metal, they've piled up for years.

Why? Simple economics: It often cost more to transport and process a hulk than it was worth.

But now, junked cars are moving faster than ever. Higher demand for steel and growing concern for conservation have made steel scrap look better and better.

Helping tip the scales is something Union Carbide helped develop: the ultra high-power electric furnace.

It can make new steel using 100% scrap. It's cleaner than other furnaces and it uses less energy.

It's also relatively small, so it may be located economically near the source of scrap, reducing transportation costs.

Union Carbide created the electrode that makes possible this versatile furnace.

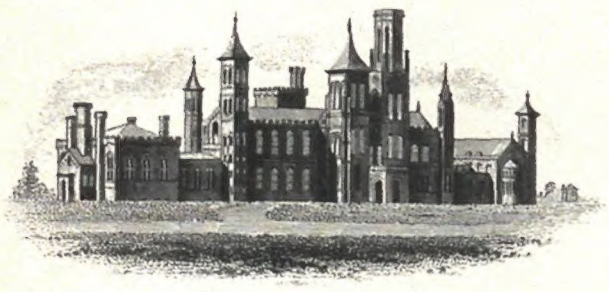
It's only one of our many contributions to the steel industry.

But it's helping the country get rid of a nightmare.

UNION CARBIDE

Today, something we do will touch your life.

The view from the castle



Even in the early 1830s, Joseph Henry was already expressing his lifelong concern for the way American science would develop

This month marks the publication of the second volume of *The Papers of Joseph Henry,* first Secretary of the Smithsonian. Edited by Nathan Reingold, this is a monumental effort directed by a consortium of societies and institutions (the American Philosophical Society, the National Academy of Sciences, the Smithsonian) and sponsored by the National Historical Publications and Records Commission. Some 15 volumes will eventually be published. This volume commences with Henry's move to a Princeton professorship from the Albany Academy in 1832, and carries forward his career through 1835.

Together, these volumes will not only illuminate the passage of 19th-century American science from the isolation of a small handful of original thinkers, such as Henry, through the technological compulsions of the Civil War to the dawn of organized research, but will also portray the continued dilemma of the public understanding of science itself. No Baconian, Henry was convinced that America must evolve its own patterns of training students for original studies in science to attempt to achieve some parity with Europe.

In the years covered by this volume he was concerned not only with the need to teach, but also with the need to work on his research studies in electromagnetism, which led to the principles of conductivity and eventually presaged the development of wireless telegraphy. Far from his mind was any thought of personal advancement. He never patented his research because he felt that such original studies as his own should not be for personal gain, and that every advance in true science should lack any tinge of commercialism. (Would that such ideals had persisted.)

The material and spiritual improvement of man was his interpretation of the calling of science, which in Henry's view lays claim to public respect and encouragement and is a pursuit worthy of an attitude of dignity. Pretenders and fakes are dangerous and should be exposed as impeding scientific progress.

What is this moral tone that continually intrudes in Henry's writing at the time? Perhaps the very smallness of the scientific community made it vulnerable to such charlatans and hucksters of commercial science as the medicine men who laid the foundations of vast fortunes with their nostrums and remedies for aches and pains (often laced with forbidden alcohol). Similarly, the dawn of technology preceded boards of control capable of effective review, patenting and licensing.

Joseph Henry hated vanity and self-promotion as much as all other modes of deception, humbugging and quackery. What a wrench it must have been for such a man to leave the ivied halls of Princeton a dozen years later and descend into the miasma of Washington. But he was shrewd and had a wry humor too, as one of his letters to his family in Albany shows:

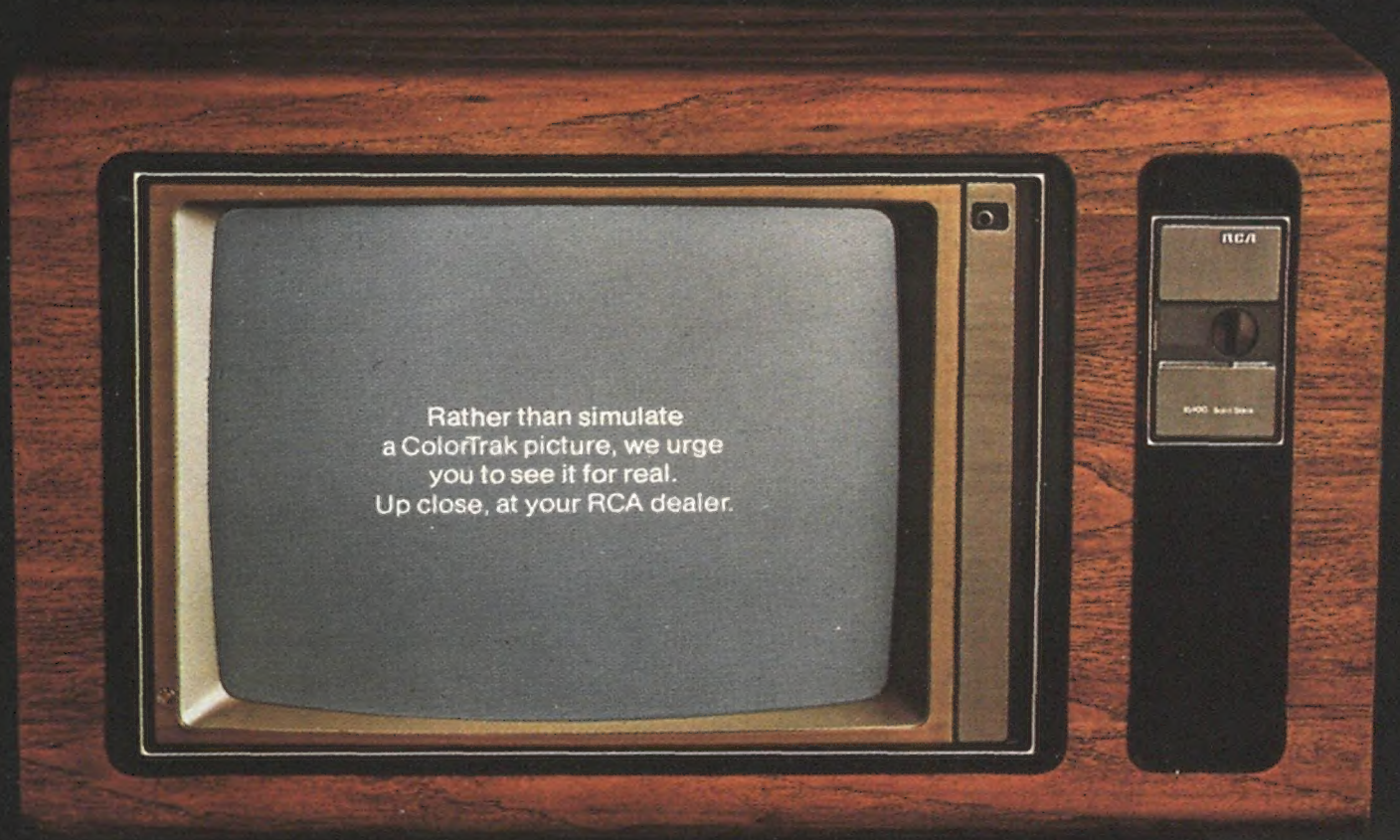
"I had a peek at Col. (Davy) Crocket [*sic*], and was somewhat disappointed in his appearance. He reminded me of a Methodist Minister, is a tall man with long black hair, wears a white hat with a tolerably wide rim. He is younger than I had supposed and does not appear more than 45 and on the whole is a pretty good looking chap."

Henry would eventually become seasoned and worldly-wise, but in all he would retain his humanity. Would that all of us could do so.

S. Dillon Ripley

Introducing the RCA XL-100 ColorTrak System.

TV that "thinks in color."



The ColorTrak System comes in 19" and 25" diagonal screen sizes. This is the 25" diagonal Model GU 830. The cabinet has a veneer of genuine pecan over selected hardwood solids. The base is made of wood materials edged with vinyl.

Its split-second "thinking" actually tracks and corrects the color signal before it becomes the picture on your screen.

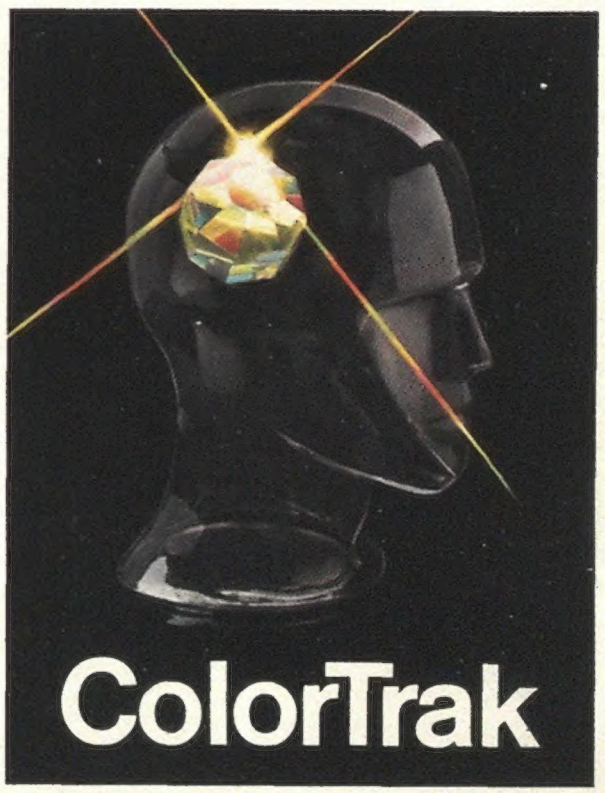
We challenge you to find a better color picture, on anybody's screen.

The more you know about ColorTrak, the more impressive its "thinking" becomes.

The ColorTrak System keeps face tones natural, automatically protected from the greens and purples that can spoil face tones.

ColorTrak colors stay the way you set them—light scenes to dark scenes, channel-to-channel.

Picture brightness automatically adjusts to changes in room light. So pictures stay vivid even in bright light.



There's a new and advanced RCA picture tube to sharpen color contrast, and enrich picture detail.

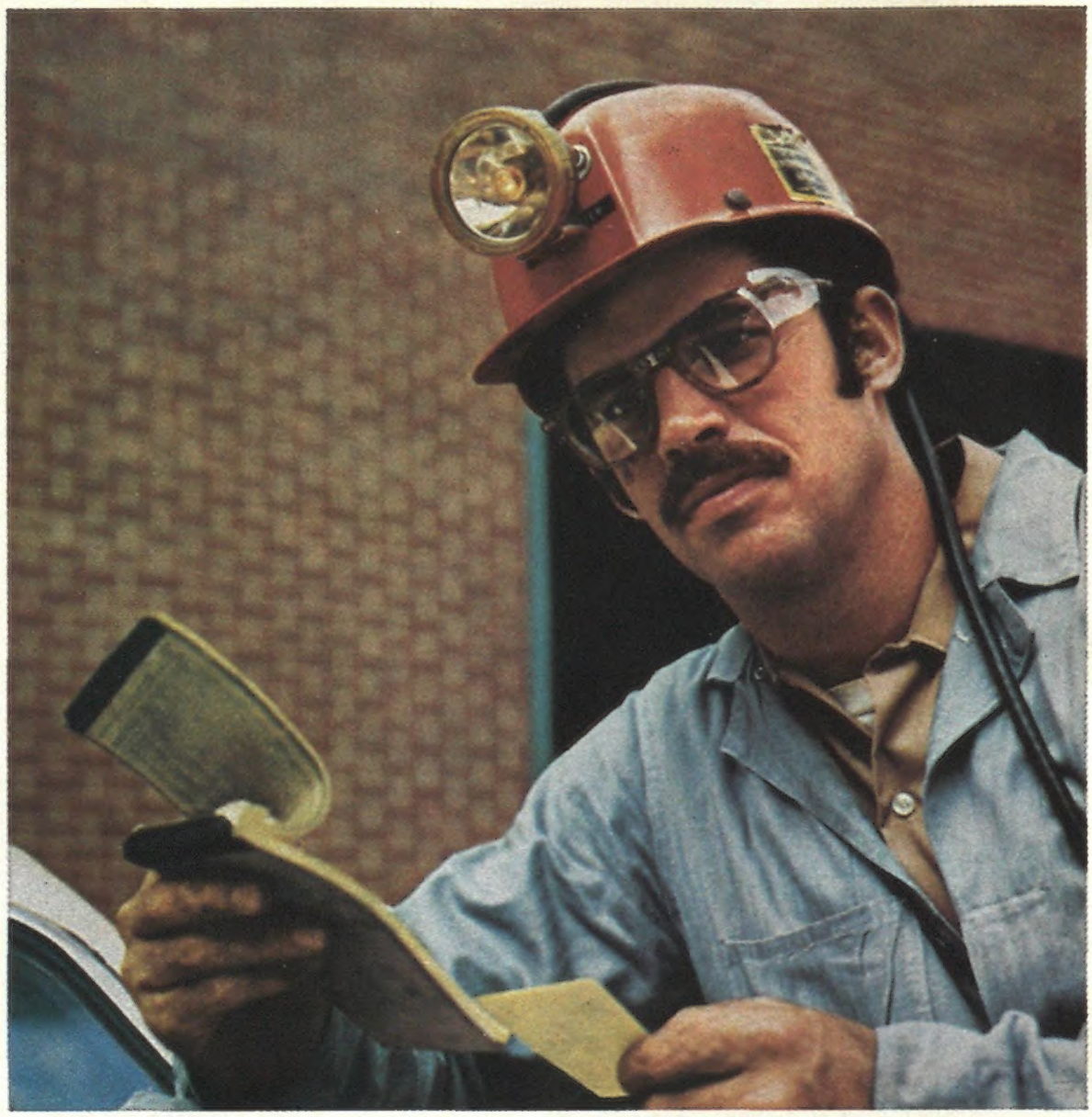
Of course, the ColorTrak System chassis is 100% solid state. And ColorTrak System sets are the most tested TV's for reliability that RCA has ever made.

All the more reason, if you're buying a color TV, to see the TV that "thinks in color":

The new RCA XL-100's with the ColorTrak System.

RCA

What one company is doing to help support America's colleges



Ken Katen earned $2,500 for his alma mater. After graduating from Pennsylvania State University, Ken decided to join Bethlehem Steel and enter our management-training program. Because of his decision, Penn State received a $2,500 contribution from Bethlehem. (If Ken had attended a privately endowed university, our contribution would have been $5,000.) Under our aid-to-education program, established in 1953, Bethlehem has made unrestricted contributions to more than 250 colleges and universities.

Ken Katen is a systems engineer for the Beth-Elkhorn Corporation, Jenkins, Ky., a coal-mining subsidiary of Bethlehem.

Brown University is using part of a special, unrestricted grant from Bethlehem for undergraduate counseling. Some 8 per cent of Brown's enrollment is made up of minority students, admitted on the basis of their demonstrated ability and future promise. Dean John M. Robinson advises a special program of peer counseling and tutoring, and other activities, for these students. Objective: to help ease their transition into a predominantly white educational environment, so that they may fully realize their potential at Brown. This is an excellent example of how colleges and universities meet special needs with unrestricted grants.

Ed Snowden wanted a college education. We helped pay his tuition. Bethlehem's educational assistance program encourages our full-time, salaried employees to continue their education. The program provides full reimbursement for tuition costs of approved courses of study. Since its start 13 years ago, 4,220 employees have taken advantage of the program. Ed Snowden, for example, earned his Bachelor of Science degree in science-education from Morgan State College while working full time in our Sparrows Point, Md., steel plant.

Ed Snowden is a community affairs representative in our Baltimore district office.

When Lucile Haas gave Occidental College $250, so did we. Bethlehem's Program of Matching Grants to Education encourages our employees to contribute to colleges and universities. For each dollar an employee gives (up to $2,000 in any calendar year), we make a matching grant of one dollar. In the past two years, 1,450 Bethlehem employees gave to 325 colleges and universities. Mrs. Haas, whose son Stephen is a graduate of Occidental College, was one of them.

Lucile Haas is a secretary at Bethlehem's Torrance, Calif., Fabricating Works.

Bethlehem BETHLEHEM STEEL

Many colleges desperately need contributions. We hope you will consider their needs.

Lance Collectors Gallery

ANNOUNCES OUR SPECTACULAR

"American Revolutionary Trio"

Not just another routine series of Revolutionary soldiers. But three spectacular fighting men — alive with the independent spirit of the cause they fought for!

Lionel Forrest, noted sculptor of American historical figures, could have depicted our Revolutionary soldiers in a score or more of the different uniforms they wore. Instead he has chosen these three — of particular interest for their uniqueness and marked contrasts. *Morgan's Rifleman* (left) in his hunting smock and round felt hat, was one of the crack backwoods marksmen who made up General Daniel Morgan's wayward band of volunteers. Besides his highly accurate "Pennsylvania" rifle, he carries a handaxe for close fighting.

Haslet's Delaware Infantryman (center) wears a stiff leather cap with a shield on its front bearing the insignia of his distinguished fighting unit. His short "tacted" coat has its corners turned up, and he carries a Brown Bess musket.

The Continental Line Infantryman (right) wears the front point of his three-cornered hat over his left eye — so it won't interfere when he marches with his Frank Charleville musket over his left shoulder. His one-piece fitted "overalls" were much preferred to breeches and stockings. This is the basic Revolutionary War uniform (though few soldiers received the full issue).

Each figure is approximately five inches high . . . and endlessly fascinating to hold in your hand and examine from every angle. Every minute detail is sculptured with extraordinary clarity — from the name scratched on a powder horn to a musket's cock and frizzen. All details are completely authentic, based on meticulous research.

Hand-Cast and Hand-Crafted in Fine Pewter

These Lionel Forrest originals were commissioned by Lance Collectors Gallery exclusively for registered edition in Fine Lance Pewter — hand-cast and hand-crafted in our own studios. Our artisans proudly apply their own touchmark to each finished sculpture.

Our closely guarded techniques make Lance Pewter unrivaled in recording the most intricate detail of these Revolutionary figures. Lance Pewter's softly gleaming luster gives them great decorative charm. Singly or together, the sculptures in Lionel Forrest's *American Revolutionary Trio* are sure to bring admiring comments — wherever you display them in your home or office. And sure to be received with *great* pleasure for Christmas!

A Certificate of Authentication comes with each sculpture. Each has on its base the registration number, sculptor's signature, the title, and the touchmarks of Lance Collectors Gallery and its artisans. Order direct from Lance Collectors Gallery (by December 8 for Christmas). Priced at $50 each, including shipping and insurance.

LANCE COLLECTORS GALLERY Collectors Circle, Hudson, Massachusetts 01749

Check for $_____ enclosed, for the Revolutionary Soldiers at $50 each, checked:
☐ Morgan's Rifleman ☐ Continental Infantryman ☐ Haslet's Delaware Infantryman
Or charge to my: ☐ American Express ☐ BankAmericard ☐ Master Charge
Card No. including raised numbers and letters_____
Credit Card Signature_____ Exp. Date_____
☐ Please send Lance Collectors Gallery catalogue at $1. (Free with order.)
Name_____ Address_____
City_____ State_____ Zip_____
Name for registration if a Gift (Please print)_____
If not completely satisfied, return in 10 days in original carton for full refund. (Massachusetts residents please add sales tax.)

308

Phenomena, comment and notes

Fiddling with energy systems, liberating animals and spacekind, and confirming Plato on floods

About 12,000 years ago a huge sheet of ice covered most of North America, but the climate was beginning to warm up and the ice sheet was receding northward. The sea level was about 150 feet lower than it is today, with so much of the oceans' water being tied up in the glaciers. But then there was a sudden surge of ice back into what is now the northern United States.

A paleoclimatologist from the University of Miami, Cesare Emiliani, and a team of seven coworkers has added some precise detail to these events. He reports in *Science* (Volume 189, Number 4208), that core samples from the Gulf of Mexico show a sudden decrease in water salinity and also a drop in temperature. By radiocarbon dating of fossil shells in the sediment layer in question, the Miami scientists were able to determine a precise time for this event—9600 B.C.

Apparently, through a number of complex climatic interactions, the warming trend caused a thin layer of ice to move southward, whereupon it rapidly melted, sending water cascading across America into the sea, presumably flooding out whatever coastal cultures were in its path. What is remarkable from the standpoint of the antiquarian, the date of this catastrophe—9600 B.C.—is almost exactly the date which Plato reported for the deluge that destroyed Atlantis. Discussing this surging glacier, Emiliani writes: "We postulate that ensuing flooding of low-lying coastal areas, many of which were

A gift he can open more than once.

COURVOISIER

COGNAC

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Brother Timothy's Napa Valley Notebook

THE NAPA VALLEY HAS BEEN THE HOME OF THE CHRISTIAN BROTHERS TABLE WINES FOR YEARS. FOR THE BEST OF REASONS.

The Christian Brothers are longtime Napa Valley vintners. We share the belief of many enologists that there is no better home in California for the choice varietal grapes we use in our table wines.

THE MATURE GRAPE VINE.
17th CENTURY FRENCH ENGRAVING.
THE CHRISTIAN BROTHERS COLLECTION.
THE WINE MUSEUM OF SAN FRANCISCO.

Our small valley is scarcely thirty-five miles long and only five or six miles at its widest point. But here in this tiny space are areas that challenge almost every fine wine growing region in the world.

PLANTING.
19th CENTURY ENGRAVING.

Some millions of years ago, Mount St. Helena at the north end of the valley, erupted in volcanic fury and left behind the gravelly loams and soils that our shy-bearing grape vines prefer. And a pattern of hills, gradually rising, which creates a myriad of weather-pockets. Each grape has found a perfect home whether it prefers coolness or warmth.

Climate and soil are only part of our Napa Valley story. Here, too, we have the quiet place to make our wines, and give them all the time they need to come to life. Slowly, patiently, in our own way. Each of our wines is made with pride, and we invite you to enjoy in them all of the special qualities found only in our wondrous-and lovely-Napa Valley. You are always a welcome guest here at our winery.

HARVESTING.
19th CENTURY ENGRAVING.

Brother Timothy F.S.C.
CELLARMASTER
THE CHRISTIAN BROTHERS
NAPA VALLEY, CALIFORNIA 94558

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inhabited by man, gave rise to the deluge stories common to many traditions."

Diehards

An earthquake that registers 7.3 on the Richter scale is a very big bump and grind in Mother Earth's dance, and if you knew one was coming, what would you do? According to *New Scientist* (Volume 67, Number 967), three sociologists have been studying the question for two years.

If there were three years of advance notice, they say, ten per cent of the inhabitants likely to be affected would leave during the second and third year, with 60 percent evacuating the premises in the last few weeks before the quake. This, the sociologists report, would be bad for business and there would be serious unemployment among those who remained (sociologists are masters at pointing out the obvious).

What is extraordinary about their findings is that, with all those leaving, there would be about 30 percent of the population crazy enough to try to ride it out and just see what happened.

Solar fiddling

While Washington squabbles over the profound question of where the new federal Solar Energy Research Institute should be located, backyard inventors are busy doing their own research (see p. 46).

Along with handcrafted residences, solar tinkerers have begun to invade the areas of automobile transport and farm ponds. According to *Farm Journal* (Volume 99, number 9), Ohio State University has devised a black plastic-lined pond nine feet deep with salty water at the bottom. The sun heats the fresh water at the top, the salty water holds the heat and the warm water is carried by plastic hose into the barn.

And in California (where else?) a designer named Mark Goldes has placed a surreylike covering consisting of solar cells on a tiller-steered contraption that looks more like a wheelchair than a car. The machine will cruise for 20 miles nonstop, hardly the answer to the freeway, but Goldes considers his solar driven one-seater something like the Wright Brothers' Flyer—a harbinger of things to come.

Things had better come along pretty fast, however, if what the Worldwatch Institute calls "the most profound ecologi-

PARKER
World's most wanted pens

Give an authentic piece of American History.

Imagine a pewter pen containing an authentic relic of the signing of the Declaration of Independence. A bit of wood that was a part of Independence Hall in 1776 when America became a nation, is embedded in the crown of this Parker 75 Americana pen. Each limited edition pen sold is individually numbered. Presented in a handmade mahogany case with brass fittings which itself is a replica of an 18th Century artifact. Available at select retailers as a unique pen, soft tip pen or ball pen. An exquisite gift for the free spirit who loves America and respects the lasting power of the written word. $100

PARKER 75

A gift of immediate and lasting value.

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13 escorted holidays: **Maupintour means more!**

Latin America

Mexico by Private Car

Your driver is your expert guide. Good hotels, meals, special events included. Frequent departures for 3 all-inclusive tours: 10 days seeing Popular Mexico, 16 days highlighting Oaxaca/Orizaba, 18 days for complete Colonial Mexico.

Yucatan and Guatemala

Mayan people and lands, past and present: Uxmal, Chichen Itza, Merida, Tikal, Guatemala City, Atitlan, Antigua, market days at Chichicastenango and San Francisco el Alto, and Quetzaltenango. Very comprehensive, all inclusive.

Central America

All seven Central American countries, each with a character all its own, for 22 days: Panama, San Blas Islands, Kuna Indians, Costa Rica, train to Limon, Nicaragua, Honduras, Copan, Belize, El Salvador, and Guatemala.

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The Uncommon Places I

19 days for the seldom seen. Overnight among the Incas atop Machu Picchu, attend the market at Pisac. See the fortress of Ollantaytambo, red-dyed Los Colorados, San Blas Islands, Angel Falls, Canaima, Caracas, Lima, and Quito.

Brazil and the Amazon

African Bahia's voodoo mysteries, Amazon jungle's headhunters, cruise the Wedding of the Waters where the Amazon meets Rio Negro near Manaus, 21st century Brasilia, Ouro Preto and Congonhas, Leticia's Indian camp, and Rio de Janeiro. 19 days.

Easter Island and Angel Falls

Adventure plus in 22 days. Rediscover legendary Easter Island's stone statues. Marvel at Angel Falls, highest in the world, and Canaima lagoon. Plus Iguassu Falls, Lima, Cuzco, Machu Picchu, Pisac, Santiago, Caracas, and Rio de Janeiro.

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Two tours: 22 days for Bogota, Quito, Lima, Cuzco, Machu Picchu, Santiago, Buenos Aires, Iguassu Falls, Sao Paulo, Brasilia, Rio. 29 days for most of the above plus Los Colorados, Llao-Llao, and Chilean/Argentine mountain lakes.

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cal challenge of the late 20th century" is to be met. The problem, according to Erik P. Eckholm, is one of fuel, but not what you'd think. The crisis is over wood.

One-third of the human race still relies on wood for fuel and the result is that vast portions of the globe—especially in the less developed parts of Asia and Africa—are rapidly being denuded. As an area's timber disappears, the inhabitants turn to dried cow dung for fuel, thus taking it out of the land's nutrient cycle. As the soil gets worse, even larger tracts of forest are cleared—often on slopes that would otherwise not come into agricultural use. This in turn leads to greater soil erosion and less agriculture.

Reforestation is one solution, but in many areas new trees are rooted up by the desperate populace before they reach maturity. There is some hope, Ekholm sees, in solar technology—such as solar cookers—but these technologies are beyond the means of most of the people in question. It seems to be a problem worthy of a major international effort, and maybe when the United States finally figures out where that Solar Energy Research Institute should be located, we'll be able to help out a little. . . .

Help from an odd quarter

In the ebb and flow of American mores and laws, marijuana has bobbed like a cork on the waters. Once recommended as a tranquilizer by doctors, it has obviously been considered an evil of late. But now, *Science News* (Volume 108, number 17) reports, medical researchers have found a new therapeutic use for it that may serve to bring it back to respectability. It was found that capsules of THC, the active ingredient, served to moderate and even, in some cases, eliminate the vomiting and nausea that so often result when cancer patients are given chemotherapy.

On people

Those of us who, by accident of birth and by choice of profession, toil in the language of the Anglos and the Saxons are acutely aware that the absence of gender endings on our nouns and verbs and so forth gives us a considerable problem. We now must employ the word "chairperson" and a host of other functional but unmellifluous terms.

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Pioneer's new High Polymer Molecular transducer technology will alter the course of high fidelity.

There's a significant new development in high fidelity that is destined to play a vital role in sound reproduction. It is intimately tied in with the piezoelectric principle.

The piezoelectric effect deals with certain crystal devices that flex when voltages are applied to them. Now, Pioneer has discovered a totally new application of the piezoelectric effect by applying the principle to ultra-thin aluminum coated high polymer film.

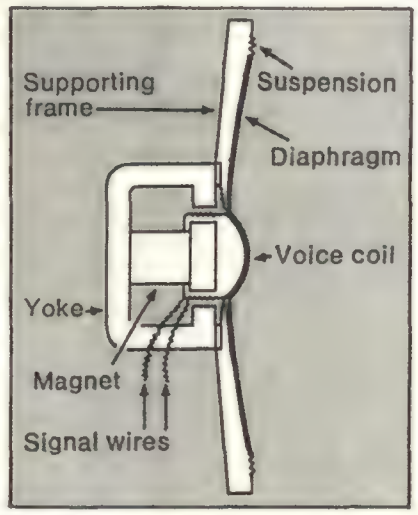

Fig. 1 Principle of conventional dynamic headphones

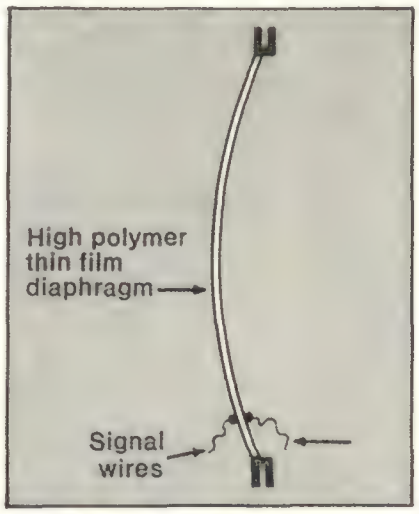

Fig. 2 Principle of new Pioneer High Polymer Molecular headphones

By employing this film as a low-mass diaphragm and applying audio signal voltages, the material expands and contracts uniformly generating acoustic energy. For the first time it becomes possible to transform electrical energy to an accurate acoustical equivalent. Such thin-film diaphragms properly mounted are capable of reproducing all music frequencies by means of an incredible "breathing" effect. The ramifications of this unique refinement of the piezoelectric principle are far reaching. Consider such immediate applications as microphones, cartridges, speaker systems and headphones — in fact, any type of electromechanical transducer requiring resonance-free performance.

There have been many attempts to create sound using diaphragm motion. For example, electrostatic speakers and headphones. But in contrast to the electrostatic principle, the new application of the High Polymer Molecular principle as discovered and perfected by Pioneer, requires no dangerous, high polarizing voltages.

The first totally new concept in headphones in over a decade.

Pioneer has successfully incorporated the High Polymer Molecular transducer principle in two new headphones that are unlike any others. Conventionally designed headphones use moving coils, miniature loudspeaker elements and other mechanical parts — as shown in Figure 1 — all of which come between you and your music. Pioneer's new SE-700 and SE-500 headphones don't. They employ a single thin-film high polymer piezoelectric diaphragm that reproduces sound directly, as shown in Figure 2. Only the diaphragm moves air — and moves it accurately, in exact conformance with the electrical signal applied directly to it. The accurate, low-distortion signals available from any standard headphone jack on your receiver or amplifier are directly translated to equally precise, low-distortion sound by the action of the high polymer film diaphragm. Nothing, absolutely nothing comes between you and the original sound.

Even though you may now own a pair of headphones, you owe it to yourself to hear these new piezoelectric high polymer transducer headphones. In fact, compare them with other types. You'll find a lower level of distortion-free sound than has ever been achieved — even at unprecedented volume levels. The experience of listening with these new Pioneer headphones is a revelation. In addition, the open-back design, light weight and soft, snug fitting earpieces permit hours of comfortable, private listening. You'll come away from your Pioneer dealer thoroughly convinced that Pioneer has altered the course of high fidelity.

SE-700, under $80*; SE-500, under $50*. Both come with a 9¾ foot connecting cable, standard phone plug and storage case.

U.S. Pioneer Electronics Corp., 75 Oxford Drive, Moonachie, New Jersey 07074. West: 13300 S. Estrella, Los Angeles 90248 / Midwest: 1500 Greenleaf, Elk Grove Village, Ill. 60007 / Canada: S.H. Parker Co.

*The value shown is for informational purposes only; the actual resale price will be set by the individual Pioneer dealer at his option.

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So, desperately, one casts about for some inventive phrase-making, turning by chance to a recent issue of *People* (October 27, 1975), a magazine with a title redolent of nonsexist opportunity. One emerges from the experience a bit shaken. *People*, like many other publications, has an editorial tic whereby certain statistical data are routinely supplied for individuals reported on, thusly:

	Weight in pounds	*Height*	*Age*
Lauren Hutton	118	5′7½″	30
Helen Hayes	100	5′	75
Carie Graves	170	6′1″	22
Deborah Mazzanti	130	5′3″	53
Frank Borman	—	—	47
Groucho Marx	—	—	85
Robert Redford	—	5′11¾″	38
Arnold Huizinga	—	—	49
Chinook salmon	25	—	—

So, these data reveal, among people we still have two commodities: women, who must be identified by weight, height and age, and men, who may be identified only by age (the inclusion of Robert Redford's height is no doubt a response to a persistent rumor that he is short, which he isn't). For fish, weight alone seems to be quite sufficient.

On animals

If the chart above represents the sum of progress in women's liberation, one can hardly hold out much hope for another movement that has now edged above the horizon: animal liberation.

Apparently a number of different movements—vegetarianism, animal welfare and environmentalist wildlife preservation—have begun to come together more closely, though a bit incoherently, and often with such emotionalism that they are dismissed by the public at large as a bit loony.

Now, however, a thoroughly unemotional young Australian teacher of ethics and political philosophy has written a smooth, calm and devastating book on the rights of all nonhuman animals. *Animal Liberation*, published by the New York Review of Books, begins with the question posed by Jeremy Bentham: "The question is not, Can they *reason*? nor Can they *talk*? but *Can they suffer*?"

From there, Peter Singer moves along through scientific and agricultural uses

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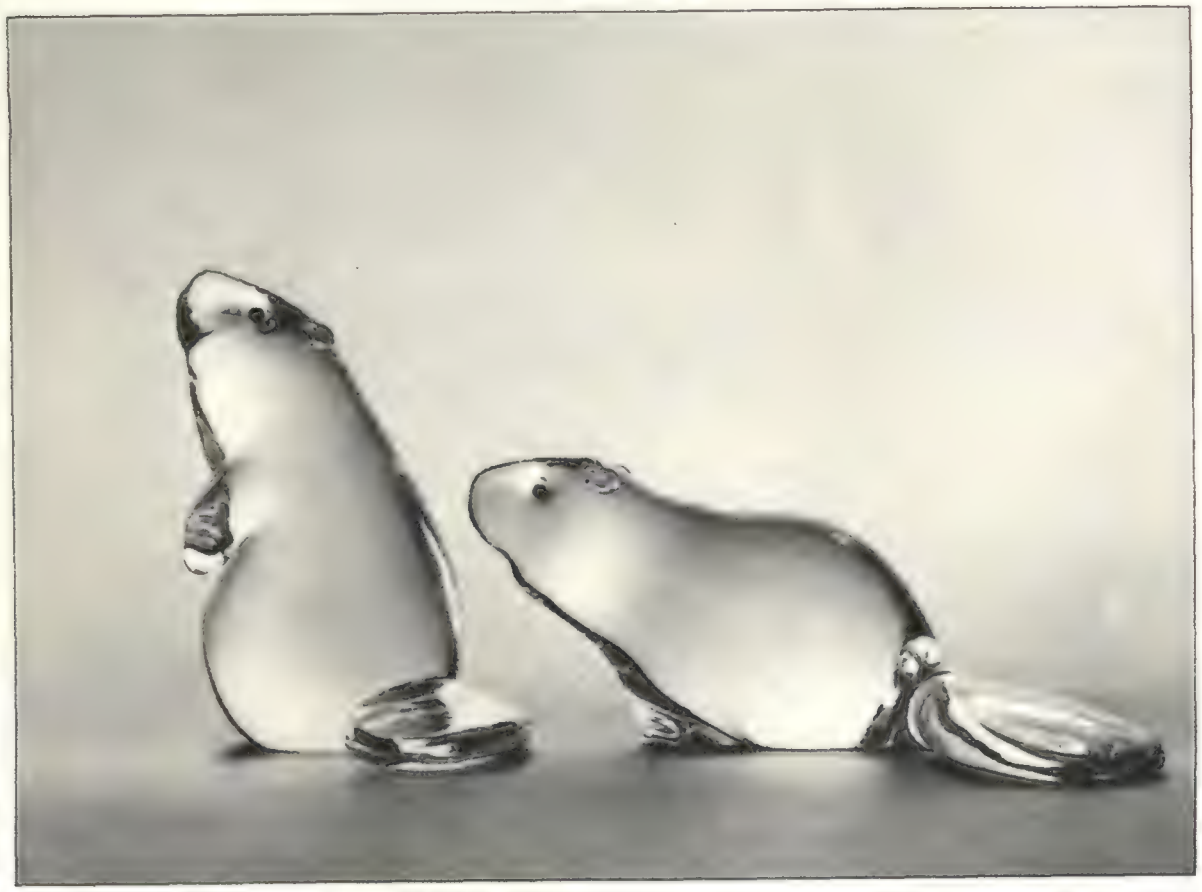
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of animals to vegetarianism, marshaling his arguments with care and style. "To protest about bull-fighting in Spain or the slaughter of baby seals in Canada while continuing to eat chickens that have spent their lives crammed into cages . . . is like denouncing apartheid in South Africa while asking your neighbors not to sell their houses to blacks."

Add to this book an earlier one—a kind of legal brief called *Do Trees Have Rights?*—and there may be the beginnings of a more widespread and coordinated movement. Flesh-eaters and scientists and animal husbandry people will not like this book one bit, but they will find it hard to refute. And any of them who read the book this month may have a bit of trouble staring that Christmas turkey in the stuffing.

On space

Of course liberation movements can go on multiplying forever—one can see the need in this country for an old people's liberation movement—and yet another one may emerge from another new book, one you probably never would have dreamed of. The book is *Living in Outer Space*, by George Robinson, published by Public Affairs Press. Robinson, a lawyer with the Smithsonian Institution, specializes in the law of space, and his message is that we had better start thinking now not just about putting men and women into permanent or semipermanent space colonies, but about the legal regimes by which "spacekind" will live.

Adducing a considerable amount of biological information about such matters as the human brain, the rhythms of human behavior, and so forth, he suggests that people living for long periods or permanently in space will indeed become different—practically a different species. So what kind of laws should govern them—those manufactured willy-nilly over centuries for earthly humans, or the quasi-military rules of present space missions which locate the ultimate decision-making apparatus on Earth? Or should treaty-like constitutions be thought through now which will permit spacekind to develop their own laws? It may seem a bit recondite to worry about such matters, but as Robinson points out, we are, after all, in the Space Age right now, whether we like it or not.

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Two hundred years ago next July the Fourth the massive bell in the steeple of the Pennsylvania State House, now Independence Hall, rang out the birth of the United States.

It signalled the adoption by Congress of the Declaration of Independence, the *first* great charter of the Nation. It marked the end of a long chain of political events which had eroded Colonial freedoms. And, it set forth the causes of the Revolution which had begun at Lexington and Concord the year before.

Today — as relevant as ever in its noble proclamation of the inalienable rights of man — the Declaration stands as an enduring legacy to us all and a lasting tribute to the fifty-six brave patriots who signed it.

Now, to appropriately honor those fifty-six men — *who pledged their lives, their fortunes, and their sacred honors* for the cause of Liberty — Fleetwood will issue, by authority of the prestigious Philadelphia '76 Commission, an inspiring collection of Philatelic Commemorative Covers authoritatively portraying *The Signers of the Declaration of Independence.*

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Appropriately, the man who signed the Declaration first, *John Hancock,* will be the first to be honored when the inaugural Cover in the collection is issued at Boston on January 12, his birthday.

On July Fourth, the thirty-second and thirty-third issues will honor *John Adams,* who seconded the motion in Congress which led to the Declaration, and *Thomas Jefferson,* who drafted the fateful document. Issued at Quincy, Massachusetts, and Monticello, Virginia — their homes — they will commemorate the exact Bicentennial of Independence as well as the precise 150th anniversary of their deaths.

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Letters to the Editor

Abigail Adams

Dear Sir: Abigail Adams' letters prove that it was a distortion for Samuel Eliot Morison in *The Patriots,* reprinted in your October issue, to state that she wrote "playfully" to her husband concerning women's rights. In the same letter, which Morison quoted in part, Abigail wrote: "Remember all men would be tyrants if they could. If particular care and attention is not paid to the ladies, we are determined to foment a rebellion, and will not hold ourselves bound by any laws in which we have no voice, or representation. That your sex are naturally tyrannical is a truth so thoroughly established as to admit of no dispute. . . . Why then not put it out of the power of the vicious and the lawless to use us with cruelty and indignity with impunity?"

Historian Morison calls Abigail "able," and says John "so appreciated her wisdom that he called her his 'Portia.' " Yet Morison in 1975 shares John's inability of 200 years ago to take Abigail seriously in the area of women's rights. ". . . I cannot but laugh!" was John's offhand response to Abigail's plea.

Betty Swords
Denver, Colorado

Dear Sir: Far from just being "secure of a place in history as the beloved and helpful wife of John," Abigail Adams has been a source of inspiration for feminists for decades.

Lynn S. Fischer
Tucson, Arizona

Dear Sir: How does Mr. Morison know that Abigail's famous admonition to her

husband to "remember the ladies and be more generous and favorable to them than your ancestors" was written playfully? We feminists have always presumed it was written with utmost seriousness and fervor. We wish John Adams had taken it just as seriously.
Constance F. Threinen
Specialist, Women's Education
University of Wisconsin—Extension
Madison, Wisconsin

Suez Canal

Dear Sir: In the following statements, one point needs clarification: "Even the statue of Lesseps, which towered over the entrance to the Port Said harbor for so long, has gone; a raging mob dismantled it after Gamal Abdel Nasser nationalized the canal in 1956, bringing an armed attack by Britain, France and Israel. . . . If any reference at all is made to the building of the canal, it is to the 120,000 Egyptians who are supposed to have died doing it."

Surely Mr. Nasser and his subordinates knew that the 120,000 Egyptians did not die digging the Suez Canal, but rather the Ismailia Canal excavated more than 2,000 years ago.

Herodotus, called the Father of History (5th century B.C.), wrote that in the reign of Necho II, 120,000 lost their lives in the excavation. "This prince [Necho] was the first to attempt the construction of the canal to the Red Sea—a work completed afterward by Darius the Persian."

The point I wish to make is that the masses today have a tendency to follow misleading propaganda, and this is another example of pulling out of context a sad historical event and presenting it as having happened during the digging of the modern Suez Canal.
T.R. Jackman
Pickens, South Carolina

Pilgrimage to Lourdes

Dear Sir: One would expect that SMITHSONIAN would appreciate the vast cultural riches given to the world by the Roman Catholic Church instead of trying to poke fun at and ridicule the Church by the use (or rather abuse) of certain idiosyncrasies of some of its members as you did in your article on Lourdes.
The Reverend Hector L. Bolduc
Houston, Texas

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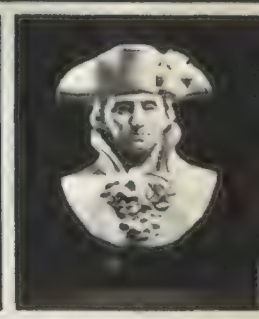

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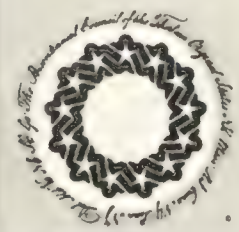

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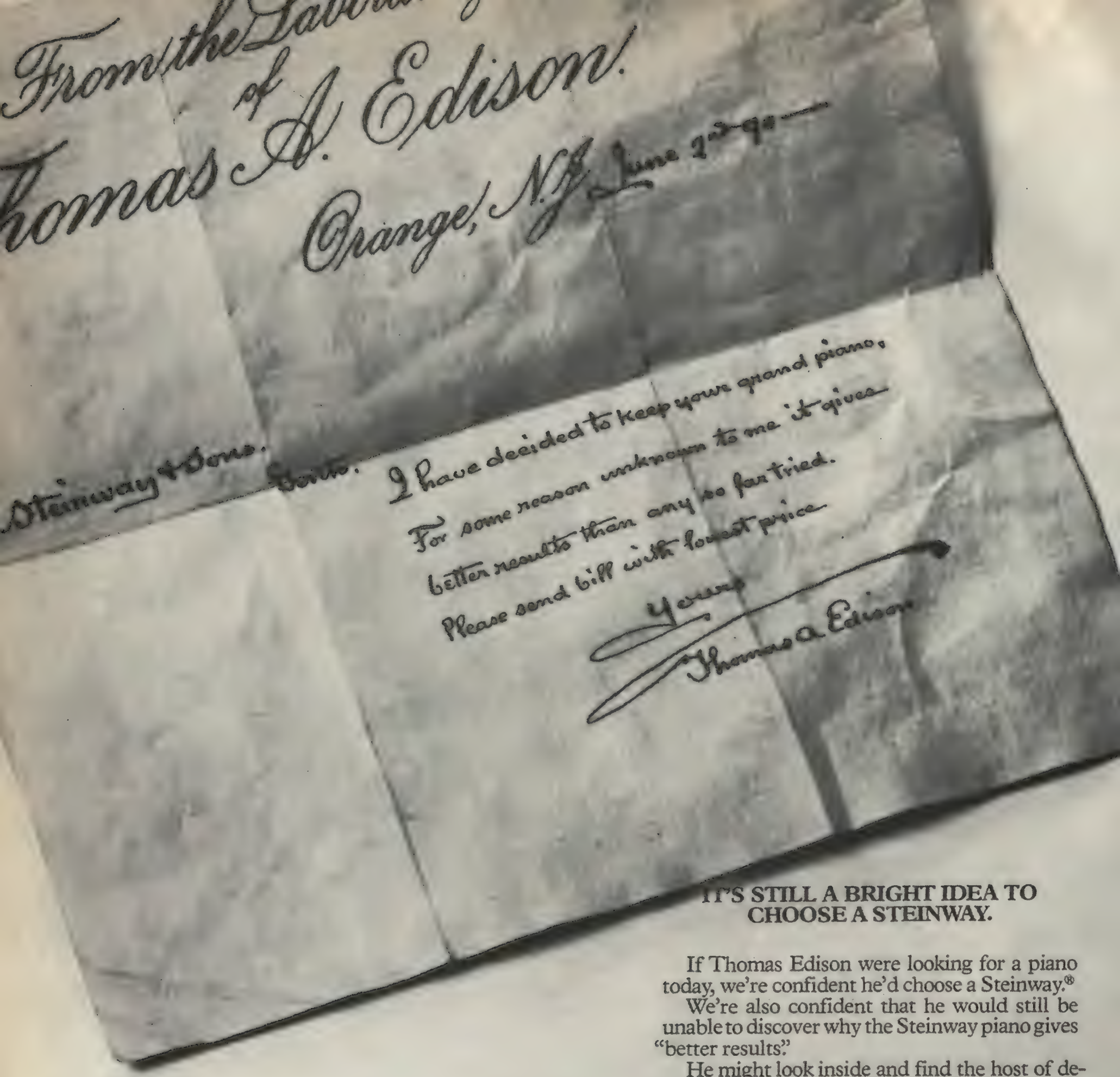
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Orange, N.J. June 2nd 90
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AIR-INDIA

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Dear Sir: Having been to Lourdes and having read much about it, I find your article bigoted, demeaning and snide.
Charles J. Cochrane
Philadelphia, Pennsylvania

Dear Sir: There are and were thousands of deeply religious people at Lourdes. But, as water seeks its common level, Gould seems to have gravitated to those who looked upon the place as a pleasant interlude and carnival. No carnival could have lasted this long unless many were being helped.
L.L. Lewis
El Cajon, California

Dear Sir: My guess would be that there was a bit too much poteen added to the "tay" in the wards at the nightly Irish sing-along. But heaven be praised that even silly old ladies come away with something from Lourdes.
Angela C. Margola
Washington, D.C.

Alcatraz

Dear Sir: Joyce Johnson's article on Alcatraz is mistaken about Robert Stroud, the famous "Birdman of Alcatraz," dying there. He was transferred from Alcatraz to the Medical Center for Federal Prisoners here in Springfield, Missouri, where he died November 21, 1963. The story of Robert Stroud's death was buried in the papers by the news of the tragedy in Dallas the next day.
Robert H. Gibbons
Springfield, Missouri

Dear Sir: The article states that "a division of combat-ready Marines landed on the island. . . ." Not the U.S. Marine Corps I knew—perhaps just a squad?
Richard B. Wasson
Birmingham, Alabama
Only 30, not a division, were sent in. Ed.

Dear Sir: Surely it did not cost $30,000 a year to keep an inmate in Alcatraz.
Raymond L. Roy
Tucson, Arizona
Mr. Roy is correct. In 1952, the yearly cost of running Alcatraz was some $750,000; the cost per man was $3,222. Ed.

Tampering with prehistory

Dear Sir: Anthropologist Loren Eiseley's

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"Poignant work of tampering with prehistory," left me with the eeriest feeling I have ever had after reading an article. What struck me most was when the little figures concealed in a miniature chamber beneath the tomb of Meket-Rē' were halted suddenly in their tracks by the shattering light of today. Had you been present at the moment when Herbert Winlock's torch shone down on them, you surely would ask yourself, "My God, what has been done, how long have these little men been living on in peace unaware that there is a fast-changing world above?" Well, the light has killed them and now they begin to rot.

My admiration goes out not only to the article but to Jonathan Meader for his fine illustrations.

Ronny L. Prondzinski
Winona, Minnesota

View from the castle

Dear Sir: I am all for Ambassador Moynihan's attitude toward the so-called Third World, and Secretary Ripley put the situation in crystal-clear perspective.

Joseph H. Hazen
New York City

Around the Mall and beyond

Dear Sir: I rise to stand tall beside ornithologist Allan Phillips, even with that parrot skin in his pocket (he mislaid a record-making flycatcher of mine that way, once) in his defense of those trays and trays of stuffed birds in museums, as detailed in Edwards Park's column.

Museum collections of bird skins are essential to the study of ornithology, worth quite as much as a fossil dinosaur, a whale (and how much room do *they* take up?) or the *Spirit of St. Louis.*

In the past 20 years I have "tagged" upwards of 20,000 birds, but they are now flying loose in the winds of Earth or heaven. Personally, I have also put many bird skins, painstakingly if poorly prepared, in collections. These are window kills, birds saved for me in freezers by friends, birds picked up by children in whose schools I give my program on bird and other animal preservation, road kills I find in driving. Most museums now beg for and depend on such donations, rather than sending their students out to shoot.

Mrs. Bradley Fisk
South Orleans, Massachusetts

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Dear Sir: For months I have been waiting for SMITHSONIAN to print an article on your new Air and Space Building. I especially hoped you would print something about Colonel Lindbergh's *Spirit of St. Louis*—and now my dream has come true. I only wish that I could sit in the historic cockpit and glance out the side window.
Michael D. Cuy
Parma, Ohio

Dear Sir: Mr. Park need not have been so reticent about touching the fabric on the Wright plane, because it is not the original. The Kitty Hawk machine was first publicly exhibited in 1916 at the opening of new buildings at the Massachusetts Institute of Technology, and at that time Orville Wright recovered the plane with a new fabric identical to the original.

When Orville died his executors found pieces of the original fabric, which he had saved. These were cut into small squares and distributed with an appropriate certificate by Lester Gardner, founder of the Institute of Aeronautical Sciences, among aviation notables and friends of the Wrights. My father, Fred C. Kelly, author of *The Wright Brothers,* was one of those who received the fabric memento, which I have in my possession.
Fred C. Kelly jr.
Washington, D.C.

Letters to the Editor

Dear Sir: I don't remember when I've had such a good, long laugh as I had over the letters you published about your inside-out cover of Pittsburgh.

If this is just a sample of our American humor and spirit, no matter how much trouble we're in, I'm sure we'll get through it somehow!
Joseph G. Mitchell
Baltimore, Maryland

From the pages of SMITHSONIAN

THE NEW EARTH

A Revolution Called Plate Tectonics

Text by Tom Alexander
Illustrations by Richard Edes Harrison and Antonio Petruccelli

Reprinted in full four color from the January and February 1975 SMITHSONIAN.

Price: **$1.00 per single copy. Bulk order prices available on request.**

Write: SMITHSONIAN Magazine, Smithsonian Institution, 900 Jefferson Drive, Washington, D.C. 20560

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To bring these historic international stamp issues to all Americans, *an extraordinary world-wide collection of First Day Covers* will be issued—each cover bearing an official Bicentennial commemorative stamp. The collection will be an officially recognized commemorative of the American Revolution Bicentennial Administration—and the *only* international collection of First Day Covers which has been so recognized.

Postmarked throughout the world

The collection will contain individual covers representing *every* nation that issues commemorative stamps to honor our Bicentennial during 1976. There are approximately 40 nations which are planning to issue such stamps. They include Great Britain, France, Mexico, West Germany, Ireland, Denmark, India, Western Samoa, Israel, Monaco, Canada and Italy.

The stamps themselves will be both interesting and educational—and each will be *the most significant Bicentennial stamp issue* of the nation it represents. Each cover will bear the official *First Day of Issue* cancellation for the stamp—and will be *postmarked in the country of issue,* at the *official post office of first issue.* As astute collectors know, this First Day of Issue cancellation is extremely important, since it officially establishes the philatelic significance of the First Day Cover.

Moreover, each cover will include an *original engraved design* that complements and enhances the specific theme of the stamp it carries. And every cover will be *individually personalized* with the name and address of the subscriber, if desired.

In addition, each First Day Cover will bear the *Official Symbol of the United States of America's 200th Anniversary*—and a Certificate of Authenticity from the Administrator of the American Revolution Bicentennial Administration, attesting to its official status.

OFFICIAL SYMBOL
OF THE UNITED STATES OF AMERICA'S
200TH ANNIVERSARY

This official symbol will appear on each First Day Cover. *The American Revolution Bicentennial First Day Cover Collection* is an officially recognized commemorative of the American Revolution Bicentennial Administration, #76-19-0574, authorized by Public Law 93-179 of the Congress of the United States, to facilitate and coordinate the events and activities of national and international significance in commemoration of the 200th anniversary of the United States.

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These historic First Day Covers will be available as a *complete collection only* —exclusively for advance subscribers. There is a limit of one collection per subscriber, and the total edition of *each* cover will be permanently limited to the *exact* number of valid subscriptions entered by the deadline date of December 31, 1975.

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Each First Day Cover will be accompanied by a handsomely illustrated *display page,* which will provide important information about the featured Bicentennial stamp and the issuing nation.

To protect and display the complete set of First Day Covers, each subscriber will receive a custom designed album as part of his collection.

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Subscribers will receive their First Day Covers at the rate of four per month, beginning in early 1976. The price of each cover will be just $2.75—and this includes the Bicentennial stamp, the complete international first day cover service, individual display pages and personalization. *No advance payment is required;* subscribers will be billed with shipment. The custom designed album will be provided to each subscriber *at no additional charge.*

Subscription deadline: December 31, 1975

As an historic international tribute to our nation's 200th anniversary—and as an officially recognized commemorative of the American Revolution Bicentennial Administration—this collection will be a prized family heirloom to pass along to future generations.

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But this is *the only time* that The American Revolution Bicentennial First Day Cover Collection will ever be offered. All subscriptions must be postmarked by December 31, 1975, to be accepted. The Franklin Philatelic Society, the international stamp division of The Franklin Mint, will handle the processing of all subscriptions and shipment of the First Day Covers. Your application should, therefore, be mailed directly to The Franklin Philatelic Society, Franklin Center, Pennsylvania 19091, *by December 31, 1975.*

OFFICIAL APPLICATION

The American Revolution Bicentennial First Day Cover Collection

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Around the Mall and beyond

If you cannot tell an *Aglaophenia elegans* from an *Aglaophenia floweri,* you share something with the Emperor of Japan. It turns out that when he visited the Smithsonian in October and made a well-publicized call on the Department of Invertebrate Zoology at the Museum of Natural History, he settled down at a microscope to look at some of the Smithsonian's collection of hydroids and compare them with drawings he had made in his own laboratory.

Dr. Frederick Bayer, curator in the department and an old Japan hand who was Hirohito's host during this hour or so of the Imperial tour in Washington, says that any scientist, Emperor or no, likes to check his own findings in a well-equipped facility like the Institution. Hirohito had brought along about ten microscope drawings of his own hydroid collection. "He is interested in taxonomy," says Dr. Bayer, "so he wanted to check his identifications against ours."

The Emperor worked carefully and deliberately and got through about seven of the specimens in the time allotted for his visit. He caught himself in error on one.

"I honestly can't remember whether he had an *elegans* and thought it was a *floweri,* or the other way around," Dr. Bayer admitted. "There was so much confusion in the lab, with all that security and the press hovering around."

It doesn't really matter. This news item is only mentionable because it looks as though not one of those hovering newshawks ever got around to identifying which hydroids had produced the Imperial mistake. It takes your present reporter to ferret out the truth. "EMPEROR GOOFS!" shouts the headline. "Confuses *Aglaophenia elegans* with *Aglaophenia floweri*" clamors the subhead.

Having provided the world's most outdated and least newsworthy scoop, I shall add what we ace reporters call a "sidebar" about the Imperial visit, and then Hirohito shall be left in peace. On the day of his visit to the Smithsonian lab, I popped over to the Museum of Natural History to join the throng of rubbernecks waiting for a glimpse of him. I found myself chivied across the street and tucked behind a phalanx of motorcycle policemen and policewomen. Though duly unnerved, I did not fail to notice ("Scoop" strikes again!) that most of them were mounted on Hondas. But I was badly shaken when I glanced up at the roof of the building across the street and saw two policemen armed with rifles and carrying binoculars. One of them had his rifle at the ready, and the other had his binoculars leveled—at *me.*

I stared up at him, and he stared down at me, and I tried to look very small and to hide behind my back the "Save the Whale" appeal someone had shoved into my hand at a nearby picket line.

In short, I was happy to break away from the front lines and get back to my own billet in the rear area for rest and rehabilitation. And while rehabilitating, I heard music filling all the bays and turrets and echoing halls of the old Arts and Industries Building, where our offices are located. As part of the Centennial exhibition—what the world was like in 1876—due to open in May, a huge player-organ has been installed on a balcony as an 1876 display. It has horns and drums and organ pipes, and they all respond to air being blown by electrically powered bellows through the patterned apertures in the roll of paper—exactly the same principle as a player piano, but on a grander scale. Anyway, this marvelous machine began playing at full volume on that afternoon of the Japanese Emperor's visit. And what was it playing, you ask? The overture to *The Mikado.*

This player organ, or small-sized calliope, was provided for the Smithsonian by Robert L. Johnson, proprietor of a "museum of early technology" down in Georgia which he calls "Whistles in the Woods." Johnson is an enthusiast about

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his machine, slipping a roll of music on during lunch hours and then fussing with the twirling shafts and palpitating bellows to make sure the brass section comes on strong at the right time or that the cymbals clash when they're supposed to. The music machine even has a triangle, dangling in its innards, and once in a while a little hole in the far right edge of the paper sweeps past the blast of air, and a small metal arm zips up, fast as a wink, and gives it a "ting."

The year 1975, now ending, proved to be a banner one for the scientists up in Cambridge, Massachusetts, where the Smithsonian-Harvard Center for Astrophysics operates. At time of writing, they found the skies putting on a splendid show, starting with the report of Comet Boethin, discovered in the Philippines in January, and carrying on through the summer with two more comets, a black hole, the strongest x-ray source ever recorded and three novas, one of which was spotted by a Japanese amateur named, of all things, Minoru Honda. That just takes us to October when the current information runs out. Things may get even livelier between now and 1976.

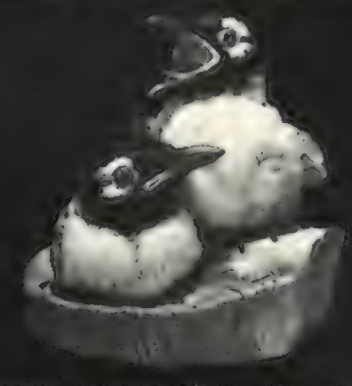
This year, too, has seen the National Zoo perfecting its hydroponics grass production. This is grass grown in trays of chemically treated water—no soil—and it provides fodder for herbivorous animals and birds without dependence on acreage that would ordinarily be concerned with feeding hungry humans. The zoo's unit now operates a big trailer where trays a yard long and half a yard wide grow lush foliage and have self-cleaning devices. Production is up to one ton of grass per year for every 1.3 square feet of tray area.

The stuff looks sort of funny at first, because it's served up to the zoo residents in rolled-up bundles with the underside showing—a whitish matting of seeds and sprouts. But the inside of these bales is green and luxuriant, and the herbivores and waterfowl dig right in with relish.

When the zoo first experimented with hydroponic grass, a keeper offered some to Nancy, the elephant. Nancy accepted it politely, looked it over curiously, then placed it on her head where she wore it all day like an outrageous bonnet on a stout dowager. At last the grass slipped rakishly over one eye, and in straighten-

Boehm Birds

AT THE SEASHORE . . . the awkward innocent charm of shorebird fledglings captured forever in bone porcelain



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Cocking his head, the downy yellow-beige baby Tern looks wistfully around hoping that a parent with a delicious snack is on the way. 5" tall $145.

The little Blue Heron has just found a tempting beetle, but is not sure just how he gets it into his beak! 6½" tall $175.

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ing it out, Nancy tasted a bit, found it good and munched it down.

The note that appeared here about the difficulty of finding a Herbert Hoover-type collar for the Orville Wright mannequin in the Air and Space Museum has resulted in a letter from Mari De Cuir, a costume designer of New Orleans. She says that far from these being a vanishing style, there are plenty of them being manufactured (along with other period collars) by a company in Cambridge, Massachusetts. You can buy them in lots of 50, and they're throwaways—recyclable and 100 percent biodegradable. She sent me a catalog from the company, Gibson Lee, Inc., and sure enough, there they are: the "Perry" model, a rounded, Hoover-style collar; size 14½ to 17½, $15 for 50, east of the Mississippi, add 50 cents west of it and a dollar for Canada and foreign parts. I wonder how that business of being biodegradable would affect Orville. Would the collar, after years of wear around that fabricated neck, suddenly disappear in a puff of pure oxygen, leaving only a ring around the papier-mâché?

One of the past year's unending curiosities over at the Museum of History and Technology is the "Whatsits?" display. This is a gathering of strange devices, meticulously made of wood or metal by people who knew just what they were doing. The only trouble is, by the time these thingamajigs were found in attics, shelves or desktops of the Smithsonian, no one could remember what they were.

For the fun of it, the Institution exhibited them and asked help from museum-goers in identifying them. The results have been so-so—a lot of wild guesses, a good many near misses ("I can remember old Uncle Harry used something like this back in Michigan for getting balls of lint out of his moustache"). *That* sort of thing —and a few real identifications.

I passed by recently and watched an Italian-American family going over the Whatsits with great enthusiasm. Grandpa was newly arrived on a visit from Italy, and he volubly identified item after item. Maybe he was right about them. His son, a grocer from Brooklyn, thought so. "It's a good thing for the Smithsonian my dad showed up," he confided in me. "He knows everything."

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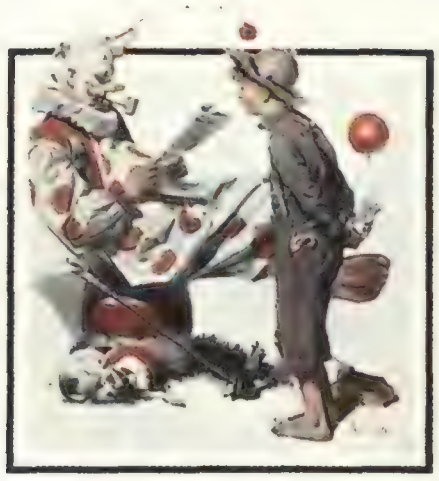

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By Phillip Snyder

A little town whose industry was Christmas

In the mountain village of Lauscha, craftsmen learned to make the exquisite glass baubles that decorated Christmas trees for generations

Now in East Germany, Lauscha nestles in the Thuringians. The old houses hark back to

Sixty miles north of Nuremberg, Germany, high in the Thuringian mountains, deep in a forest of 80-foot-tall Christmas trees, sits the village of Lauscha. Its ornamentally decorated, slate-covered houses perch on steep streets nestled at the bottom of a narrow mountain valley. In the 1930s Lauscha looked like a storybook German town.

At that time most of the glass ornaments on American Christmas trees came from the immediate vicinity of this little town. Lauscha was the birthplace, in the 1840s, of a cottage industry that supplied virtually all blown-glass Christmas tree ornaments until just before World War I, when a Viennese company began to copy the Lauscha ornaments. Later, Polish and Czechoslovakian glassblowers did the same, but Lauscha remained the principal ornament maker for the United States up to World War II.

By 1930, approximately 2,000 homes and 6,000 people in the immediate vicinity of the hamlet were engaged in a craft almost unchanged since before the turn of the century. An ornament maker's home was his factory. His wife and family were its staff and assembly line. He had a small *Werkstatt,* or workshop, attached to his house.

If you dropped in on a glassblower unexpectedly, you would probably find him perched on a high stool, bent over his bench, clad only in his long underwear, a pair of brown leather slippers on his feet. Behind him, far from the flame of a gas burner, were drums of lacquer and a hot pot of silvering solution, a com-

Nowadays a few old-time glassblowers, like this one, carry on Lauscha's traditional cottage industry.

Lauscha's glass birds, with legs that clipped onto a branch, were famous wherever trees were decorated.

the days when every home was a small factory and most handmade products were aimed at Christmas.

bination of silver nitrate, quicklime and milk sugar. Every glassblower had his own family formula.

His wife handled the tedious job of silvering the inside of the ornaments. She filled each one-quarter full with the solution, then shook it. To keep the silvering spreading evenly, she dipped the bulb in hot water several times. Uneven silvering showed through even after the ornament had been lacquered, and wholesalers would turn those ornaments down. After the coating was complete, she poured the excess solution into a basin where the silver was chemically separated to be used again. Then she hung the ornaments up to dry in rows from the ceiling rafters.

The following morning most of the silvered ornaments were dipped in various colored lacquers. The family grew so accustomed to the overpowering smell of lacquer that they scarcely noticed it, but others never got used to it. An importer who visited the village in the 1930s said that as you approached in a car, you could tell 100 feet away that you'd come to a glassblower's cottage.

All members of the family helped with the painted trimming that decorated many of the ornaments. When the paint was dry, the oldest child was entrusted with scoring the six-inch stems or "pikes" with a small blade coated with an abrasive. Once scored, the pike broke off easily and cleanly. Then the youngest child was given the job of fitting on little metal caps. Working 8 to 15 hours, a family could make from 300 to 600 ornaments a day, often six days a week.

Glassmaking began in Lauscha in the 1590s when religious persecution in the German province of Swabia forced groups of Protestant glassmakers to leave their homes. They were drawn to the Thuringian mountains by an abundance of wood, sand and limestone, the necessary ingredients for glassmaking. In 1597, with the help of the Duke of Coburg, they built a small glass factory in Lauscha.

Gradually, the village became a center for drinking glasses, bull's-eye window glass and other products which were sold by peddlers. But as more glassmakers were drawn to this center, authorities decided to limit new factories because of the heavy demand they were making on the wood supply from local forests. As a result, some glassblowers set up home workshops.

In the middle of the 18th century some of these craftsmen began to make glass beads, supplying jewelry and millinery trades throughout Europe. But glassblowers in Bohemia developed a method of making shinier beads than those produced in Lauscha, and almost overnight Lauscha lost most of its bead market.

Art director at the J. Walter Thompson Company, Phillip Snyder is a long-time collector of early tree ornaments. Some of those described here are his.

Spout and handle of delicately blown teapot were annealed by hand. The glass boat (below) has a sail of cardboard and rigging of tinsel.

Hard times prevailed until a Lauscha glassmaker succeeded in duplicating the Bohemians' silvering formula. He saved the remnant of the town's business.

He also blew thick-walled glass balls which he silvered with his new mirroring solution. Since the 1820s heavy glass balls had been made by Lauscha craftsmen experimenting to see how large a bubble they could blow. They were known as *Kugeln* and many had been "silvered" inside with lead or zinc to make them reflect. Some were fastened to wooden crowns and hung from the ceiling during the Christmas season. The first written record of glass Christmas tree balls being produced was in 1848, when "six dozen of Christmas tree ornaments in three sizes"were recorded by a Lauscha glassblower.

Gasworks provided steady flame

In 1867 a gasworks was built in Lauscha. For the first time glassblowers had a steady, very hot, easily adjustable flame, making possible large, thin-walled bubbles of glass. A paper-thin one-inch version of the old heavy *Kugel* was perfected. Glass ornaments were molded by blowing a bubble into a cookie mold. Soon glassblowers were producing pine cones, apples, pears and crystal icicles for tree ornaments. In a short time they were being exported to America.

American store buyers, including F. W. Woolworth, began making side trips to Lauscha while scouting for toys and dolls in nearby Nuremberg and Sonneberg. Ornament-making totally dominated the life of Lauscha and the neighboring village of Steinheid.

By 1890 the Lauscha glassblowers had perfected the use of molds. The top and bottom halves of a mold were glued to a set of iron tongs. By the 1930s this had evolved into a handmade iron device with a steel spring which was clamped upright on the workbench. It held the mold at the right height and allowed the glassblower to open and close it with a pedal.

Reheating the closed end of a thin tube of glass which he had just sealed over his gas burner, the craftsman blew a bubble the same shape and only a little smaller than the ornament he was about to make. Quickly, he placed the still orange-hot molten bubble in the bottom half of the mold and closed the top, leaving only the blowing end of the tube protruding through a small hole. Working fast, before the glass could cool and always blowing downward into the mold, he expanded the thin glass bubble inside to fill the mold. After a few seconds, he opened the mold and a bird or acorn or some other recognizable shape emerged. The growing need for molds brought a new type of craftsmen to Lauscha—skilled artists or doll makers who could mold anything the American importers asked for.

Over the years, glassblowers of Lauscha reproduced every conceivable fruit and vegetable—even including several different pickles. Dogs, cats, monkeys and bears abounded. Clowns and storybook characters were popular, as were the Christ Child, angels and the Christian symbol, the fish. A whole village of different little glass houses and churches could be hung on the tree, also objects like purses, pipes, drums, violins.

One of the most enduring patterns was the bird with a spun-glass tail. Originally it hung from a delicate glass hook protruding from its back or head. By 1900 glassblowers had borrowed the clip from the clip-on candle holder of the period, and the birds acquired either one or two metal spring legs, which were soldered to the clip base before being glued into indentations in the bird's belly.

Many people remember or still have the fragile glass bird from grandmother's tree, but few have ever seen the many different kinds of birds that were originally made. In addition to a number of small birds native to Germany, unidentifiable to most Americans, there were cockatoos, parrots, owls and the now extinct passenger pigeon. Regardless of species, most birds, including a peacock, had a two-inch tail made of hair-fine strands of spun glass. Those which didn't had a crinkly wire tail.

Santa Claus figures were always fashioned without legs, rounding off at the bottom of Santa Claus' coat. Santas from Lauscha almost invariably carried little Christmas trees. In the 1930s Czechoslovakian glassblowers imitated the German figures, but they never showed Santa Claus carrying a Christmas tree.

Enthusiasm for balloon ascensions gripped both Germany and the United States in the 1890s and was reflected in balloon-shaped ornaments, complete with wire-tinseled mesh ropes and embossed lithographic cutouts of angels and Santa Claus riding in the gondola. Motoring was similarly reflected on Christmas trees of the 1920s, when Lauscha glassblowers produced a tiny period car. And when the teddy bear craze gripped America, many teddies began appearing among the angels and Santa Clauses.

Hand-painted child's head ends in a "pike" where blower's tube projected. The stork (below) was one of Lauscha's many bird motifs.

Trumpets that blew, bells that rang

Some shapes were produced without molds. To make these, the glassblower pushed and pulled free-blown bubbles into different shapes while they were hot, using wooden tools and an asbestos-covered leather glove. They blew tiny teapots and annealed delicate spouts and handles to them. In the same manner they made trumpets, as well as lyres, anchors and butterfly bodies with spun-glass wings. The toadstool, considered a sign of good luck in Germany, was a common object made without a mold. Trumpets that could be

An ear of corn and a pear were the products of an orange-hot glass bubble blown into a mold.

blown and bells that rang required the utmost craftsmanship, and one master craftsman blew, twisted and coaxed a thin rod of glass into a delicate eight-inch stork which stood majestically on a Christmas tree.

In Lauscha, Friday was the day for marketing ornaments. Wives would strap towering baskets of them on their backs, often with additional bundles tied alongside, and off they would go, looking like blackbirds waddling with half-spread wings, to catch the train for nearby Sonneberg where the warehouses were.

Sunday afternoons, when weather permitted, ornament makers fielded a soccer team against doll makers or truckers. After the game they returned to a beer hall and boasted exorbitantly about how many ornaments they had made that week while consuming quantities of beer and bratwurst.

Traditionally, Monday was the day for the men to go to town to buy their supplies. But by the 1930s the system had begun to change. It was more efficient to have the collectors they worked for supply the glass rods and the five-gallon cans of lacquer, delivering these by truck. In some cases the collector's truck also began to call for the big baskets of ornaments. Woolworth, Kresge, Kress and America's largest independent importer, Max Eckardt, all had warehouses near Sonneberg; glassblowers now worked for one company.

The finished boxes of ornaments moved from Sonneberg by rail to the ports in the north of Germany. Steamship lines gave very good rates to America's ornament importers, for the lightweight Christmas tree balls made perfect "top cargo," filling the hold after it had almost reached its limit with heavy cargo.

The hard but somehow satisfying way of life of the glassblowers of Lauscha was totally disrupted in 1939. After the war the town found itself about ten miles inside East Germany. In 1949, in an effort to help the West German economy, the United States sent Max Eckardt and one of his sons to try to establish an ornament industry there. A number of Lauscha refugees lived in the Coburg area, only about 20 miles from their old homes, and there was still a market for the fragile, hand-blown and decorated ornaments.

So between 1950 and the early 1960s about 20 percent of America's ornaments were again imported from Germany. A school for glassblowers was started in Neustadt, West Germany, only a mile from the border, and the old Lauscha men trained up to 15 young glassblowers a year. But the work was hot and hard, and as the West German economy boomed, there was too much "quick money" to be made elsewhere, with medical insurance and pensions thrown in. If an ornament maker's son wanted to follow his father's trade, his sweetheart would remind him, "Hans already owns a Volkswagen and you have only a motor scooter." Few young girls in the new Germany dreamed of working as hard as the cottage workers' wives had.

Black market in ornaments

About 600 glassblowers and their families moved to West Germany by sneaking through the woods on dark nights. Among those who stayed in Lauscha, a ten-year-long black market in Christmas tree ornaments developed. On foggy nights Lauscha men stealthily carried bundles of their fragile glass ornaments, rolled in tablecloths, to silent border meetings where they were slipped under the barbed wire. In return they got razor blades, coffee, cigarettes and other commodities hard to obtain in the Eastern Zone.

By the 1960s, times had improved on both sides of the border but, East or West, the ornament makers continued to have little except the satisfaction of their work. Today, in West Germany, fewer people make ornaments by hand with every passing year. And in Lauscha only a few old men, too old to work regularly, still blow ornaments in their homes. Others blow them on a production line at the town's government factory. They may even use a number of their old molds. But few of these fragile, fanciful ornaments now find their way to America, where the Christmas tree is ever more likely to be decked with plastic.

An imaginative man-in-moon face typifies
the early work of Lauscha's cottage craftsmen.

By Sam Love

Houses designed with nature: Their future is at hand

Technology exists to create dwellings—or refit old ones—to be largely self-sufficient, and it beckons us toward a new, decentralized society

While the greensward roof of this experimental home designed at University of Minnesota may need to be

Old eighth-floor apartments in large urban areas have ways of continually reminding us of our dependence on the smooth functioning of a complex maze of systems. Consider something basic, like water. The eighth floor of my building is the top, making it the end of the pipe. An occasional synchronization of toilet flushings can rob the cold water while the dishes are being washed and scald your hand.

But that's only part of the problem with eighth-floor living. Last winter the owners of our building had difficulty finding furnace oil. When they finally found it at a higher price, the management used the increased cost as an excuse to raise the rent.

For the last few years my urban life has become just unsettling enough for me to start thinking about alternatives to my eighth-floor apartment. You can imagine my excitement in 1973 when I stumbled across a poster illustrating a radically different structure integrating a number of technologies—greenhouse, solar heater, solar still and wind generator—so that the residence could be relatively self-sufficient. Day Chahroudi, who at that time was a dropout scientist existing on daydreams and food stamps, conceived the architectural form, which he termed a Biosphere, as a life-support system within a free-form "fibercement" shell sculptured in harmony with the Earth's surface. Hallelujah! I thought. The buildings for the Sun Age have arrived. All of those environmental and social threats from nuclear power and fossil fuel generators are now as obsolete as the urban horse-manure disposal problem.

Thus, with a positive vision of the future clearly planted in my overstimulated brain, I set out on an architectural odyssey to examine firsthand projects which are striving toward the goal of more self-sufficient structures. My trip took me across the country, out lonely dirt roads and deep into blighted cities. After years of work in the environmental and energy area, I knew that Day Chahroudi was not the only one harboring such dreams. Interest in alternative energy systems has exploded. Solar energy has gone from being the rather obscure hobby of a handful of backyard inventors to a cause célèbre. Entire government offices now exist to give out money to large corporations for solar research. The solar energy budget this year for the Energy Research and Development Administration (ERDA) is $38.2 million compared to $7.6 million one year ago; the fiscal year 1976 budget is expected to be double that of fiscal year 1975. Companies are gearing up to sell prefabricated collectors to a market that Arthur D. Little, Inc., a prestigious consulting firm, estimates could reach $1.3 billion by 1985. But Chahroudi's poster envisioned more than just tacking on solar collectors to generate electrical power; he proposed residences which integrate numerous technolo-

mowed occasionally, it serves as excellent natural insulation. Also, plant respiration is used for cooling.

gies toward the goal of creating a more decentralized society. So these are the types of structures on which my trip focused.

To Chahroudi the end result of self-sufficient houses is considerably more than simply reducing utility bills —it's a new way of life. As his poster explains: "Instead of working at a job unrelated to tomatoes, getting paid and buying tomatoes from someone who never met the people who grow the tomatoes, if you live in a Biosphere and you want to eat a tomato, you grow a tomato. . . .

"A large network of people whose only connection is changing money for labor is replaced by the family living in the Biosphere. This is more pleasant because one's activity has the context of one's own needs, not the abstracted needs of an enormous social organization. It's no fun spending your life picking other people's tomatoes."

I found Day Chahroudi working by an electrostatically charged balloon in the Solar Research Laboratory at the Massachusetts Institute of Technology. The day I visited him he was wearing a T-shirt displaying Guru Maharaj Ji's picture and exhortation, "Peace for those who seek it."

Perhaps because both Chahroudi and his ideas are unconventional, he has difficulty finding research money that will allow him to build a full-scale house. But he has found support for some of his work which focuses on problems plaguing glass greenhouses. Even though the traditional greenhouse does a good job of collecting solar radiation during the day, the heat gained from the sun is lost at night, thus making supplemental heaters necessary. In addition, the structures can get so hot that they become practically useless in summer. Chahroudi's work in New Mexico and at MIT led him to search for either a coating for glass or a plastic which would change state when too much sun hit it.

After years of effort—most of which has been largely unsupported—Day has developed, with the assistance of Sean Wellesley-Miller, an MIT architecture professor, and John Brooks, a chemist, a plastic material that transmits sunlight better than glass. But unlike glass, this material, which Chahroudi calls solar membrane, retains 90 percent of the heat that it collects. As a result of the membrane's properties, less supplemental heat is needed at night. To overcome the problem of its absorbing too much sunlight and thus overheating the structure during the day, they are now at work on another material, which he calls Cloud Gel, that changes from clear to opaque white at a specific preset temperature, say 80 degrees. Although Cloud Gel is still in the developmental stage, the membrane is now being marketed for experimental applications through a Boston firm. Before the material is used on residences it might well find useful application on commercial greenhouses.

Once the bugs are ironed out of the materials, Chahroudi hopes that mass production can bring the costs down to a reasonable level. The energy costs for producing the plastic material could be high, but his calculations indicate that over the lifetime of the material more energy will be recovered than is initially required to produce it.

But whereas Chahroudi's work is still largely in the laboratory and sketchpad stage, others are attempting to build partly self-sufficient structures.

After a long train trip from Washington, I reached Minneapolis on a below-zero February night. The next day I met Dennis R. Holloway, an architecture professor at the University of Minnesota. In his early thirties, Holloway is a conventionally dressed dynamo of energy and imagination. His scheme is called Project Ouroboros, after a mythical serpent that lived by devouring its own waste and feces. In 1973, in the university's Environmental Design class, approximately

Sam Love, Washington environmental consultant, wrote an article on toilets in SMITHSONIAN, May 1975.

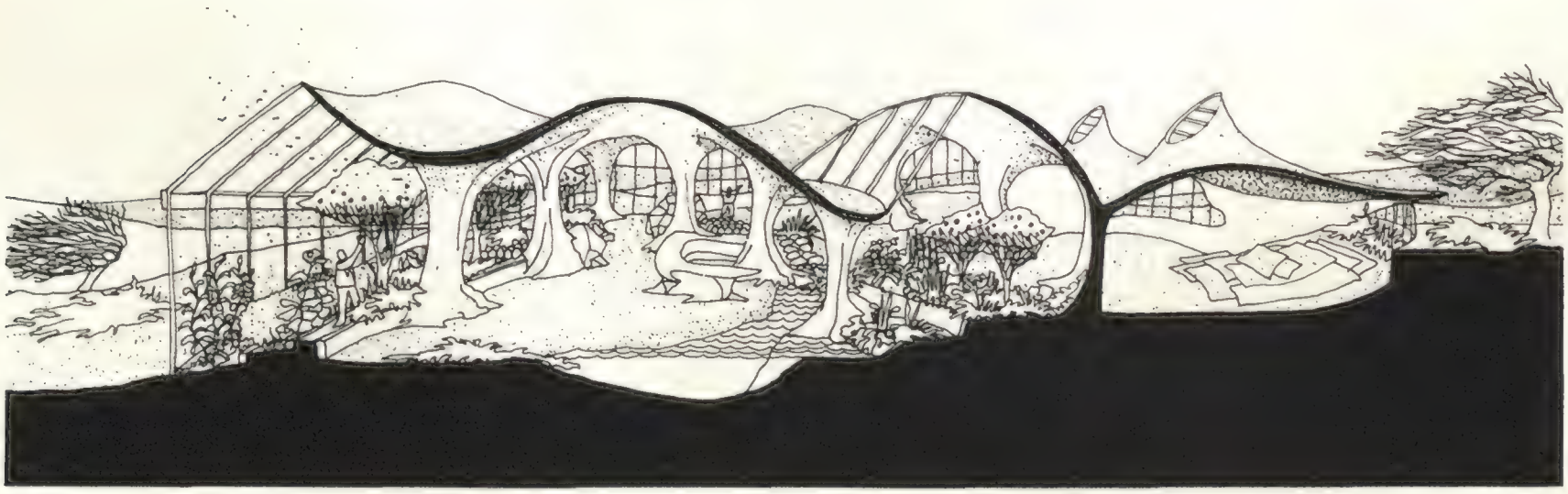
150 students were given the task of designing a structure stressing the incorporation of energy-saving, recycling devices. While actually building the house was not the purpose of the class assignment, construction seemed like a natural extension of the students' work, so they started scrounging grants and materials from local foundations and builders. Now, two years later, the house is virtually finished and its systems are being tested. Students are living in it.

In actuality, most of the technology used in the house is readily available to anyone who wants it. For example, it uses the solar collector system developed by Harry E. Thomason, a Washington, D.C., inventor (See SMITHSONIAN, November 1971). It operates by storing water which has been heated by the sun's rays as the liquid flows between a glass covering and a black metal plate. For roofing, Ouroboros uses sod—a material that has been used to cover houses in Scandinavia for hundreds of years. The grass provides winter insulation, cooling in summer and sound deadening.

To a visitor, it is evident that Ouroboros itself does not represent a technological breakthrough; its contribution comes from the integration of existing technologies into a cooperating organism. There may be nothing new about equipment such as vents, but as applied to the Ouroboros house they help make it possible to cool the structure in summer without air conditioning. That is important even in a northern state, because Minnesota, for example, presently expends more energy on air-conditioning in summer than on heating in winter. Self-cooling is possible in the Ouroboros house because much of it is built underground and it makes good use of air currents. By mounting windows underneath roof overhangs, which stop just short of touching the earth piled against the house's outside walls, air entering the house must first pass through grass. Thus the designer is able to take advantage of the transpiration of the grass to cool the incoming air.

Then, unlike conventional rooms which have almost no air circulation, the cooled air currents passed through the structures and out through vents in the roof. With such techniques the interior can be kept 15 degrees cooler than the outside temperature during summer days, which in Minnesota is usually enough to eliminate the need for air conditioning.

Such ingenious techniques can have application on standard houses. To explore the relevancy of their ideas to conventional structures in dense urban areas, Project Ouroboros last year acquired an old two-story house in St. Paul from the Department of Housing and Urban Development. Students and some construction union apprentices are now remodeling the house to install proper insulation, a solar collector, greenhouse, compost toilet, wood stove, air circulation vents, appropriate windows and minimum-use water appli-



At Massachusetts Institute of Technology, a visionary architect, Day Chahroudi, designs "self-sufficient" houses, as above, in which solar and other new technologies combine with nature for independence.

Minnesota's Project Ouroboros house proves that a solar house need not appear too "far out" in design.

ances, and to utilize other techniques that will make the rambling old house a sparing user of energy and resources. They hope to have the second Ouroboros house finished in late 1975.

That both houses are being built with volunteer labor, donated materials and no support from big national institutions such as the National Science Foundation, or from private national foundations, testifies to local interest in the work. Almost $80,000 worth of materials have been donated to the project to date. How much it would actually cost to build or remodel a house similar to either of the Ouroboros houses is an open question. One estimate is that the new house, if built conventionally, might cost more than $100,000. The solar collectors alone cost nearly $5,000. When asked if the high price tags discourage him, Holloway replied: "These prices really aren't meaningful because many companies donated their most expensive materials to get listed on the contributors' plaque inside the houses. Also, remember that this is not a suburban home but a laboratory, and we are learning a lot here that can be applied to other old and new structures."

One thing that has been learned from Project Ouroboros is that each climatic region needs its own architectural style if houses are to work with nature and not against it. In Minnesota the summers are milder than the winters, but in Alabama the opposite situation exists. Even such standard rules of thumb as at what angle solar collectors should be mounted to maximize effectiveness may not be so standard after all. In Minnesota they have found that although a 60-degree slant might be thought the optimum for getting the most from the sun in the dead of winter, the clouds don't read physics texts. The winter sky is so overcast that very little sun is available. Ouroboros therefore uses another angle—closer to vertical—which catches the most sun when it is shining.

Home truths from Integral House

Next, I visited the Farallones Institute in California. This private organization is remodeling an old house in residential Berkeley so that it can become more self-reliant. In many ways the work is similiar to that of Project Ouroboros, but it clearly surpasses the Minnesota work in the area of urban food production. Under the direction of Helga and Bill Olkowski, authors of *The City People's Book of Raising Food,* the Integral House, as the Berkeley project is being called, is designed to utilize the residents' waste to help support garden and greenhouse food production. Waste water from the house's sinks and showers—but not its toilets—will be utilized to irrigate the vegetables. Fertilizer will be created by composting waste organic material and human feces. Closely coordinated to the vegetable production is the raising of rabbits and chickens. Feed for the livestock comes from algae produced in an aquaculture system and from certain organic material.

By integrating the waste, vegetable and livestock production functions, a relatively closed system may evolve where a minimum of outside input is needed. The Olkowskis and their son have already tested most of the Integral House's food system in their own home on a small lot in Berkeley. For more than three years they were able to produce all of their meat and vegetables, leaving only grain and dairy products as necessary purchases. Their professional background as urban entomologists has led them to some interesting discoveries. In their work with chickens they found that egg production can be maintained at high levels with a diet of one-fourth commercial chicken feed, one-fourth urban insects and one-half grass clippings. They have chosen to work with rabbits because they are among the most efficient protein converters and are able to thrive on the parts of vegetables which humans don't eat.

Houses designed with nature

Project Ouroboros in Minnesota and the Integral House in California represent only a small part of the effort to create a new architecture for a resource-scarce world, which will someday be unable to sustain the large-scale, tightly interconnected networks that undergird our present society. A recent survey by William A. Shurcliff, a Harvard physics professor, gives some indication of the scale of this work. It describes more than 81 partially or fully solar-heated buildings in the United States which are already in existence or will be soon. They prove that the technology exists to trap the sun's energy for heating homes. As fossil fuel prices escalate and disruptions occur, more such houses undoubtedly will appear and contemporary sunshine will begin to replace the use of fossil fuels, which are simply ancient sunshine stored for us thousands of years ago. In many cases the technology is no more complicated than the plumbing associated with a flush toilet. All that is missing now is a high enough energy cost to make sunshine competitive. But each increase in energy costs brings that reality closer.

Although utilization of the sun's energy through solar devices is a very important part of a viable future, it is only one piece of an emerging picture of how architecture can work with nature, not against it.

Throughout conversations with those who build and study solar devices and related technologies, one theme keeps recurring—solar collectors create a different consciousness. They are a mandala, a universal, mystical symbol that is said to reveal the wisdom of the way the world works.

The insights gained from sun consciousness will influence future architecture. In fact, this could be the real value of work on houses which have self-sufficiency as a visionary goal. They illustrate the ways in which tomorrow's new houses and remodeled versions of today's can function in greater harmony with their environment, thereby requiring less subsidy from a resource-starved world. Both the Ouroboros houses and the Integral House are being built with a large amount of student input. In time these students will be designing commercial structures, and this new consciousness will be reflected in their work. Some of the lessons already learned include:

- *The sun rises in the east and sets in the west.* Sometimes simple things can be so obvious that they are completely ignored. The positioning of roof-mounted solar collectors on houses north of the equator requires that the bulk of the roof face south in order to catch the most sunlight. This principle can also be important to nonsolar-heated houses: In the morning the sun can heat parts of houses that are used in the early part of the day, and in the evening it can warm the sleeping areas. It should also dictate the location and number of windows more effectively than common in present practices.
- *Overhangs can help heat a structure in winter and cool it in summer.* A recent report by the American Physical Society concluded that windows on the south side of a building can be good solar collectors. But what works beneficially to heat a house in the winter can work adversely to overheat it in the summer.

Uncomplicated elegance and efficiency

The summer sun, however, can be blocked by an overhang. And if the overhang is not too wide, the winter sun, which is lower in the sky, can pass under it and into the window. Overhangs are a standard feature of old buildings in warm climates, but in an age of air conditioning they are being forgotten. Perhaps in a time that worships electrically powered solutions to problems, the overhang, which takes full advantage of the sun's seasonal shifts by relying on nothing more complex than the art of standing still, commits the unpardonable sin of being too simple a device.

- *Insulation is isolation.* Heat can be transmitted through some substances better than others, which is why bricks often feel colder than a wood floor to the touch of bare feet. Work on solar collectors has forced a rethinking of the amount of insulation a building should have. How much insulation a house needs depends upon local conditions, but the National Mineral Wool Insulation Institute reports that good insulation techniques on 75 percent of new construction, the upgrading of insulation on 25 percent of old housing units and the installation of storm doors and windows on 12 percent of these older housing units could cut $3.1 billion from the nation's energy bill by 1982. Cumulative savings from 1973 to 1982 would equal $17.1 billion, while the installation costs to consumers would be only $6.4 billion. Good insulation also saves on air

The geometry of stacked oil drums not only provides a cheerful interior for this house in New Mexico but, filled with water and with a movable outside wall, the drums are the heating and cooling system.

conditioning because it helps to keep the hot air out.

• *Thick walls change temperature more slowly than thin walls.* The ideal building material would stay warm in winter and cool in summer. Because of their large thermal mass, some materials such as adobe bricks come close to achieving this. Computer studies have shown that certain adobe buildings constructed by Indians in the Southwest are within a fraction of an inch of the optimum thickness to keep the structure cooler in summer and warmer in winter. Similarly, houses built either completely or partially underground can be very energy-efficient.

• *Trees don't have to go through a sawmill to be useful.* The perfect solar device would—at no cost to the owner—heat in the winter and cool in the summer. Technologists working on solar-heating and air-conditioning units may be some distance from achieving their goals, but nature has given us a device that can do it. Deciduous trees located near the south side of a building can shade and cool it in summer; because they lose their leaves in winter, they can let the sunshine through to warm it in the winter when heat is needed.

These ideas, simple as they seem, are still not fully appreciated by the public. But following them could produce some unique and elegant solutions to age-old problems of finding comfortable shelter. For example, Harold R. Hay, a California inventor, has built a test house which uses nothing more elaborate to heat and cool it than a rooftop pond of water covered by a sheet of movable insulation. During the winter, the interior space is heated by uncovering the pond and letting it absorb heat from the sun. At night the pond is covered with the insulation and the warm water in contact with the ceiling keeps the interior spaces warm through radiation and conduction/convection. During the summertime the pond is cooled at night by nocturnal radiation, evaporation and conduction to the atmosphere. On summer days the pond is covered and heat from the interior space is absorbed into the rooftop water. A prototype home is now being tested at Atascadero, California.

Steve Baer, a backyard inventor in New Mexico, has also used the Hay principle of placing a large mass of water in close proximity to the living area, but he achieves this by building a wall out of water-filled 55-gallon oil drums. The southerly facing drum wall of his "zome," at it is called, is covered by plate glass and a movable door, which can be operated to warm or to cool the water.

In summer the door is opened at night and closed during the day, and in winter it is opened during the day and shut at night. The thermal effectiveness of the metal drums is increased by painting the outside surface black and the inside white. Except for the door, which is raised and lowered with a hand-cranked winch, there are no moving parts.

In an age that revels in complexity, the drum wall system is so simple that it shouldn't work, yet it does. The zome's drums and skylights keep the inside temperature in the 55-to-75-degree range in winter and below 82 degrees during the summer, even though outside temperatures may range from zero in winter to more than 100 degrees in summer. On the clear February day I visited the zome, the inside thermometer recorded 68 degrees and the outside one 35 degrees at four o'clock in the afternoon. Equally ingenious are the zome's skylight covers, which Baer calls Skylids. Operating like a Venetian blind, the louvers are opened to let sunlight in and closed to retain the heat. However, unlike window blinds, the movement is triggered automatically by a small cylinder filled with Freon gas that expands when heated by the sun. As it increases in volume, it fills a reserve cylinder on the opposite side of the shutter and the louvers open. In the absence of sunlight the gas cools and contracts, tipping the balance and closing the shutter. Baer's company, Zomeworks, is now manufacturing Skylids.

Experiments in Europe

The Europeans have devised an even simpler system for utilizing the sun. A collector constructed by the Laboratoire de l'Energie Solaire in France, consists of nothing more than a plate of glass in front of a masonry wall 35 to 40 centimeters thick. The wall is painted black, and there is an airspace between the glass and the wall. Slots at the bottom of the wall allow air to enter the space and become heated. It then leaves the collector through small openings at the top. The wall itself serves as a heat store. According to reports, the collector provides two-thirds of winter's needed

heat. An overhang blocks the summer sun so that it doesn't overheat.

The experience of most people who are working on these houses reveals that complete independence from outside systems is, for all practical purposes, impossible. However, it is possible to have living units which require much less energy for sustenance than our contemporary suburban homes.

As important as the actual technical work on such houses, though, is the fact that they are the first steps toward decentralized communities functioning in greater harmony with the Earth's natural processes.

Perhaps people have always harbored such dreams. What may make the difference, though, in today's vision is the present condition of the social organism. Considering current pollution, resource depletion, crime and population rates, it does not take either a computer projection or a genius to realize that the not too distant future is going to be radically different. The chief factors in such a transition are not technological but social. In most cases the technology for a new but different tomorrow is waiting. Now the critical point to be resolved is how it will be used.

Farm chores in city: Waste organic material from the house is used to grow a year's worth of vegetables.

Intensive farming methods turn backyard of Berkeley, California, house into largely independent food system.

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C. D. Batchelor's devastating cartoon in New York's *Daily News* summed up isolationist feelings as Hitler marched toward war. Even after Britain and France declared war on the Axis in 1939, most Americans, though hoping for Allied victory, felt much this way about our getting involved.

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By Daniel P. Moynihan

Cartoons still make Uncle Sam nation's witness

Ever since our young nation was symbolized by simple-yet-sly Brother Jonathan, these visual statements have prodded politicians

At this remove in time it seems a bit hard to add further to the faults ascribed to William Marcy Tweed, but it does seem to be the case that he gave political cartoons the worst kind of good reputation. He did not worry, he told a lieutenant, about what the papers wrote about him. It was that cartoonist Thomas Nast. "My constituents," Tweed explained, "can't read." Ever since—I shall be happy to be proved wrong in this—it has been assumed that cartoons had a relation to serious political comment rather like that of comic strips to the novel. The implications of the original Italian term, *cartone*, still linger: "a drawing on stout paper made as a design for a painting . . . to be executed in fresco or oil. . . ." Not, that is, a finished work; not, certainly, of high seriousness.

We may note that as the editorial page of the nation's most prominent newspaper aspired to ever Higher Seriousness, its cartoon disappeared. Yet so, some say, did many of its readers. Correspondingly, one of the brightest and surely most influential editorial pages in the nation today is that of *The Washington Post*. Just possibly this could be connected with the fact that the *Post* has had, in Herblock, one of our brightest and most influential editorial cartoonists.

Even so, cartooning continues to be regarded in the title of the indispensable study by Stephen Hess and Milton Kaplan as *The Ungentlemanly Art*. And not just in the United States, but also in Britain, from which the American tradition in political cartoons derives. Max Beerbohm in an "Epistle Dedicatory to Britannia" introducing his collection, *A Survey*, observed with fine resignation: "You say that you have always frowned on *some* of my drawings? True, Madam; and thank you for reminding me. Over some in every batch you have frowned, murmuring a fine and a favourite phrase . . . 'Not in the very best of taste.' "

Not indeed. As in life. It was not in the very best of taste for President Johnson to display his operation scar for White House reporters that day in 1966, and it may not have been in the very best of taste for David Levine to seize on the incident. But the result may be the hardest and truest statement about the Vietnam War to emerge from that long travail.

There are many such statements in any history of cartoons. We see the beginnings of an American style that portrayed the United States as Brother Jonathan —a Maine fisherman or perhaps a saltwater farmer. Nothing grand, but no fool, and above all, no toady. An allegorical era ensues, and then, toward the end of the century, a kind of false realism, given to racial stereotypes and affecting the insular arrogance we once discerned in the British.

The influence of Darwinian ideas is to be seen, for example, in Grant Hamilton's 1898 depiction of Spain as a bloody and prognathous semibeast. This fate particularly befell the Irish during the 19th century, whose jaws jutted and jutted until the creature was indeed very apelike. Jay Norwood (Ding) Darling and Daniel R. Fitzpatrick restore civility on this score, but continue in the development of an American style which is at once realistic and fanciful, culminating in the present profusion of talent—Oliphant, Rosen, Mauldin, Szep, Wright and Fischetti, to name a few.

Our first newspaper cartoon, by John W. Jarvis in 1814, ran in New York and shows President Madison killing the hated anti-British embargo—a terrapin.

Full-fledged Uncle Sam says "Now git—durn ye!" in Charles Bartholomew's summary of war with Spain in 1898. This appeared in *Minneapolis Journal.*

O! dont force me to take it, Brother Jonathan—Give me Holland Gin, French Brandy — any thing but this D—d Yankee Perry — it has already fuddled me.
Perry

Oliver Hazard Perry's famous victory on Lake Erie in War of 1812 inspired this Amos Doolittle sketch of Brother Jonathan

Mexico's General Santa Anna was caricatured by G. Thomas in 1846 just before United States declared war on him in a fit of acquisitiveness.

Theodore Roosvelt's declaration that we would police Western Hemisphere produced this Dalrymple cartoon in a 1905 issue of *Judge* of T. R. twirling his famous "Big Stick."

Rare foreign policy cartoon by Thomas Nast marks 1872 Geneva Tribunal when "apple of discord" between U.S. and Britain was supposedly pierced.

Take it, Johnny—take it I say—
It will mend your morals & your manners too, friend Johnny.—
why cant you take it?—
Plague on you, you shall swallow it.

gleefully forcing "Perry" (potent drink made from fermented pear juice) down the gullet of a squirming, protesting John Bull.

"The Sleeping Giant Begins to Feel It" as Japan invades northern China in 1937. Hugh Hutton did this drawing for *The Philadelphia Inquirer.*

J. N. ("Ding") Darling's indictment of German military might during World War I reflects growing U.S. sentiment for joining in the fight.

De Gaulle's 1965 statement that France would quit NATO sent Hugh Haynie of the Louisville *Courier-Journal* off to his drawing board.

America's political cartoonists created, out of their collective genius, Uncle Sam, the symbol of the American nation, the single indisputable contribution of political cartoonists to the political culture. Not quite in the best of taste. Benjamin Franklin would perhaps have approved, but even Jefferson, one feels, would have liked someone more, well, Ciceronian. Nor yet a gentleman: certainly not by the standards of the Society of the Cincinnati. A merchant, rather. Avuncular rather than dignified.

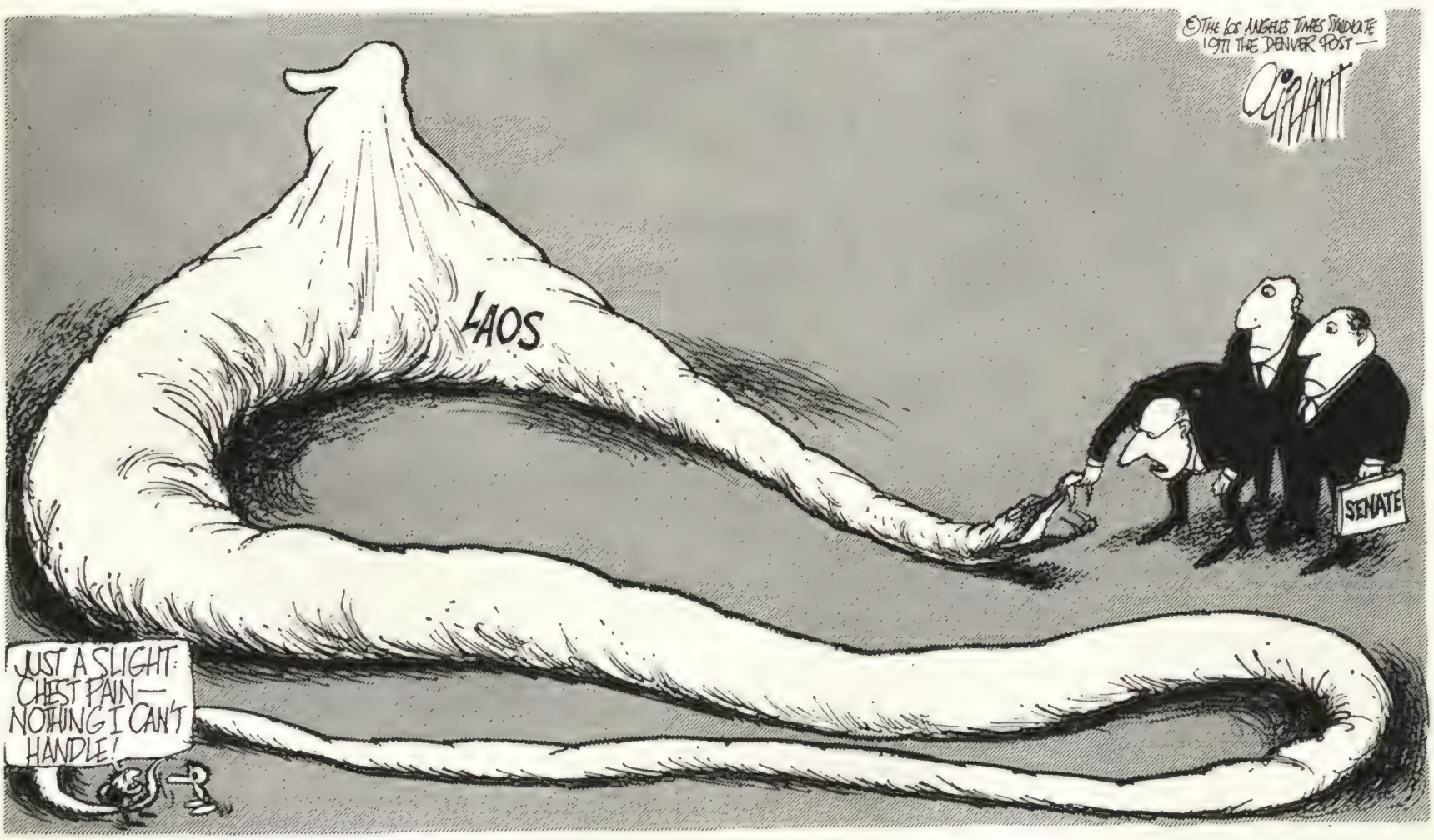
The name, we can now agree, comes from "Uncle" Sam Wilson, a Troy merchant who sold and shipped supplies to the U.S. government during the War of 1812. He so labeled his casks, and "U.S." became "Uncle Sam."

Allan Nevins thought Uncle Sam a disgrace, a "crude stereotype" that denies the complexity of the modern nation. And yet he hangs in there, undefeated and essentially unchallenged, as much so in the press of Russia and China—and on the stage there as well—as in our own. Does some instinct tell us that, such as they are, these are our roots and had best not be forgot? Let each reader judge, and allow me to encourage the exercise. I am a New Yorker, raised in the City. I worked once for the governor in the state capitol in Albany, a few miles south and on the other side of the river from Troy. I like Uncle Sam, and connect with him. I know the farms where his beef came from; know what his warehouses were like (Troy hasn't changed that much); know what the Hudson river sloops were like that would have carried his cargo. But what about the citizens of Hawaii or Oregon, New Mexico or North Dakota? Any connection? If not, does a better representative come to mind?

This, of course, is not for us to say. It is up to the cartoonists to offer alternatives; our opportunity for judgment comes thereafter. We shall see. In the meantime, my loyalties are unshaken. Uncle Sam may be crude, but he is no caricature. As I watch his progress, he seems to me an emphatic witness to the central subject of the cartoonist's art, which Beerbohm described as "politics and the deplorable part which human nature plays in politics. . . ."

Statesman-philosopher Daniel Moynihan's text introduces the forthcoming cartoon book of the Foreign Policy Association, excerpted here by permission of William Morrow, publisher.

Richard Nixon's slightly uptilted nose delighted such cartoonists as Pat Oliphant. "Come on out, Richard—We know you're in there!" a senator shouts in this 1971 feature in *The Denver Post*.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Barbara Shaw Jameson
The DC-10
MCDONNELL DOUGLAS
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By Mary H. Cadwalader

Charles Carroll of Carrollton: a signer's story

He risked his fortune to attend the birth of the United States, and he lived long enough to watch his nation move toward maturity

There must have been quite a hubbub in the room. It was August 2, 1776, and in Philadelphia some 40 men had gathered to sign the month-old Declaration of Independence, newly engrossed on parchment. The signers well knew that a noose around the neck awaited them if the war (and the dream) were lost.

Tall, bony John Hancock who had already, in his bold script, taken the plunge, passed the document to a slight Marylander near him. "Will you sign it?"

"Most willingly." Reaching for the quill, the Marylander wrote in a tidy hand: *Charles Carroll of Carrollton.* An onlooker, aware of the signer's fortune, remarked, "There go a few millions."

Charles Carroll (at least three other Charles Carrolls were prominent in Maryland at the time, which is why he signed himself "of Carrollton") was then 38, a newcomer to the Continental Congress and its sole Roman Catholic. "An excellent member," said John Adams, "whose education, manners, and application to business and to study did honor to his fortune, the first in America." Nevertheless, in that convocation bristling with brains and activism, Carroll was something of a loner. His religion, his European education and his unassuming ways subtly isolated him.

Courtesy The Historical Society of Pennsylvania

Courtesy Richard Fuller Kimball

Medal marking the 50th year of independence was dedicated to Carroll—"Surviving Signer."

Carroll, at right, has back to table as Congress votes for independence. Francis Hopkinson writes.

Historians differ on his contributions to Founding Fatherhood; some see him as a quiet mover and shaker, others as an egocentric money-grubber bent mainly on enhancing his purse. He saved a voluminous legacy of letters, documents, speeches and manuscripts that shed clear light on his actions and on the times. So while some of the signers have vanished with little trace, Carroll was brought vividly to life again in a recent exhibition at Baltimore's Museum of Art.

Guest curator Ann Van Devanter set off the project when, researching one small portrait, she learned this signer had been painted by at least 14 artists—almost as many as tackled Jefferson and Adams. She enlisted the Maryland Historical Society, the Peale Museum, the Maryland Hall of Records; she wrote some 120 Carroll descendants and snagged loans from them as well as from a dozen museums; even Queen Elizabeth came across with a painting.

Results of this cooperative effort filled seven galleries at the Baltimore Museum. Well above 200 items—half of them never before shown to the public—ranged from silver, porcelains, furniture, maps, sketches and mementos to portraits. The collection illuminated a remarkable man whose fingers lay across the pulse of the new nation for most of his 95 years.

Charles Carroll's life was sprinkled with paradox. An arch conservative, his politics were revolutionary; a cautious financier, he backed visionary ventures; hugely rich, he eschewed pomp; a lawyer, he never practiced; a statesman, he kept out of the limelight. Vigorously healthy (he rose at five, walked half a mile daily to a spring bathhouse for an icy before-breakfast dip, rode horseback in his 80s), he thought himself puny and weak. His wife became addicted to the opiates used to dull the pain of many illnesses. His only son was an alcoholic failure. Yet Carroll survived cheerfully until 1832—the last, by six years, of all that brilliant company of signers.

Charles' grandfather, Charles Carroll the Settler, began life in Ireland. He landed in Maryland in 1688 with bright prospects as Lord Baltimore's friend and attorney general, but suffered from the growing anti-Catholic bias in Maryland. Though the colony had been founded by Catholics, they were periodically disfranchised, double-taxed and forbidden to hold public office. The Carroll coat of arms, which in Ireland had borne a hawk resting, was altered by the immigrant, in celebration of his flight to the New World, to depict "a hawk rising." Carroll must have pondered ruefully how his hawk had been shot down. Nevertheless, he married and stayed. His heir, Charles Carroll

Color photographs by Robert de Gast

Doughoregan Manor, outside Baltimore, is little changed from the sketch, above,

of Annapolis, added land to that accumulated by his father, collected annual quitrents from tenant farmers, planted and shipped tobacco, imported wines and woolens, collected debts for relatives, whom he charged five percent, lent funds and extracted interest when due. With partners, he established the Baltimore Iron Works (at a remote hamlet north of Annapolis), which eventually returned £400 annually. He rankled at the anti-Catholic strictures, but he kept a low profile and prospered.

Courtesy Mr. and Mrs. Paul Mellon

Joshua Reynolds painted this portrait of young Carroll while he was studying law in England.

His only child was Charles Carroll of Carrollton, born in 1737—and here a minor mystery surfaces: The marriage document of the senior Carroll and Elizabeth Brooke is dated 1757, by which time the son was 20. If the boy was indeed illegitimate for a time (and brief references in two extant letters tend to verify this), it is odd that no mention was made of it, then or later. But the 18th century took these things in stride: The last Lord Baltimore's son was a bastard, yet was the recognized heir.

At any rate, the senior Carrolls lived in all gentility both in Annapolis and at Doughoregan Manor, a plantation 40 miles north, where a handsome house was a-building. Young Charley, like his father and grandfather, was programmed for a Jesuit education.

At ten he was sent off to boarding school. Two years later, in 1749, he was dispatched with a handful of other Catholic boys to the then preeminent Jesuit college of St. Omers in France.

He was a good student. "I have got the fifth place in my school, among three & twenty boys," he wrote his father proudly. Commanded by Papa to study law, he balked, but gave in. At Bourges he ground away at Roman and French civil law and then spent five years at London's Middle Temple on English law. He found law a dry subject and argued that it was a waste of time since, as a Catholic, he was forbidden to practice in Maryland. His sober, scholarly life with tutors was a far cry from that of the young bloods of the day whose drinking, gambling and brawling, along with their gold-laced coats and dandified ways, helped make London an overblown, decadent capital.

Papa wrote fond but admonishing letters, warning against "gamesters," commending him for dressing simply (Papa sent cash, but little for luxuries), direct-

of the 18th-century estate. The trees have grown to massive size and the landholding has shrunk to one-fifth of the 13,500 acres of 1832. It is owned by an eighth-generation descendant.

ing him to find a good dancing master and to learn to fence. He had "good hair when a child, if it continues so, pray wear it, it will become you better than a wig." And, "Drawing is a pretty accomplishment and I wish you could spare time to attend to it, but let nothing divert you from the study of the Law." Parties and theater trips were salutary, Papa conceded, but only as occasional relaxations so that "dear Charley" could study harder.

Longing for home and mother, Charley grumbled but obeyed. At last in 1764, his education complete, he was allowed to return, sadly aware that his beloved mother had died without his seeing her again, and rejected by the only young lady, a Miss Louisa Baker, that he had courted. He is described by a contemporary as not tall, but with fine features; he had a graceful carriage (the dancing master was evidently worth the outlay) and was a superb horseman. If his nose was a trifle long and his mouth a trifle prim, his warm smile and European manners won him quick approval. He lived with his father and quickly formed "the habit of business," tending the growing fortune Papa had seeded.

Marriage seemed his next duty, but it took him four years. A cousin, Rachel Cooke, appealed to him and they set the wedding date for July 1766. A summer fever laid Charles low and the nuptials were postponed till fall. Nevertheless he refused to be disheartened. In a jocular mood for once, he wrote a friend that he would wed on November 5, which happened to be the anniversary of the Gunpowder Plot—"but it is no wonder a bloody-minded Papist should chuse a day for feasting and merriment which had like (if you believe ye story) to have been fatal to a Protestant king and Parliament."

Fall came and it was Rachel's turn to be ill; she died in three weeks. "I have had the great misfortune to lose Miss Cooke," he wrote a relative. "You who were well acquainted with her must be sensible how great a loss I have sustained . . . I feel all ye weight of it."

But he was young and resilient and marriage was still on his mind. This time a suitable match was right under his nose. Some years earlier, his father, Carroll of Annapolis, had taken into his home Rachel Darnall and her daughter Mary. Rachel's father-in-law, a Carroll kinsman, had been appointed, thanks to Carroll, to a government post but had poked his paws freely into the public till. Charged with embezzlement, he had skipped the country. His son, Rachel's husband, did no better, also leaving the country in disgrace, leaving wife and child penniless.

His daughter, Mary, or Molly, as she was called, was a winsome, outgoing girl and in June 1768, Charles Carroll of Carrollton, aged 30, made her his bride.

They never lived at Carrollton—a large parcel of land deeded by Papa—but settled in the Annapolis house. Molly must have been good-tempered, for she allowed her husband to name a daughter Louisa Rachel, after his two lost loves.

She also agreed to a marriage settlement which, in lieu of dower rights, gave her £300 a year in the event of his death. (Dower rights would have meant one-third of his fortune, plus guardianship of the rest for minor children.) Thus father and son were at pains to protect their fortunes for their posterity.

Aside from the family lands, some 80,000 acres (a

Mary Cadwalader wrote about a medical study of how emotions give early warnings of future disaster in May 1974 SMITHSONIAN. *She lives in Maryland.*

Courtesy Kennedy Galleries, Inc., New York

The signer's father, Charles Carroll of Annapolis. His house still stands on Spa Creek there.

traveler wrote that one could hardly cross Maryland without traversing Carroll lands), Charles Carroll of Carrollton, it is estimated, had then some 200,000 pounds sterling with more to accrue at his father's demise. At his own death 60 years later he was worth nearly $2 million—no longer the largest fortune in America, but in 1832 not to be sneezed at.

Carroll of Carrollton early felt that independence from Britain was an ultimate necessity, writing in 1762 that he saw no alternative. In his letters he is forever on guard against predatory English dictates. When Parliament passed the Stamp Act, Carroll seethed; the Act's repeal a year later (1766) contained a declaration that still claimed for England broad power over Colonial affairs, and Carroll was not mollified.

If Parliament invoked a right, wrote Carroll, "to restrain us from manufacturing, this Restraint would be more oppressive than the Stamp Act itself."

In 1773 a clash in the press brought Carroll to the forefront of public notice. The *Maryland Gazette* published a series of letters between "First Citizen" and "Second Citizen" on the current governor's high-handed behavior in setting salaries for Colonial officials. The Maryland Assembly had lowered these fees, whereupon the governor dissolved the Assembly and reinstituted the higher pay scales.

Everyone knew who the "Citizens" were. Daniel Dulany, eloquent lawyer and scornful of the Carrolls (with whom he had a running feud), argued the governor's side in a dialogue between "First Citizen" and "Second Citizen" which he published in the *Maryland Gazette*. Charles Carroll then assumed the pseudonym of "First Citizen" in order to attack Dulany's position. Soon the "First Citizen"—Carroll—was reaping praise and acclaim. His letters were given credit for a landslide election that year, when every Maryland county sent antiestablishment delegates to Annapolis. Equally important, they influenced other Catholics to swing away from the Crown.

The Dulanys were Irish Marylanders who had converted to the Church of England and thus enjoyed perquisites denied the Carrolls, who had no great opinion of them anyway. When Lloyd Dulany wrote a scathing letter accusing the father, Carroll of Annapolis, of "Vice and profligacy," the son had to respond. Carroll was anything but a swashbuckler and thought the custom of dueling absurd but, boiling, he sent back a letter to Dulany saying he would ride out the next day at dawn—a veiled invitation to a duel.

"Why you silly puppy," Dulany retorted the same day. "How can you be such a fool as to insinuate that a certain person is afraid. . . ." Fortunately, no one was there to meet Carroll the next morning.

Presently the First Continental Congress gathered in Philadelphia. Carroll did not serve as an official delegate because of his religion (papists were not welcomed in weighty councils) but went along as an observer. Though moderates held the reins that year (1774), he wrote his father that, much as he dreaded a war, "This controversy will at last be decided by arms. I will either endeavour to defend the liberties of this country or die with them."

In the spring of 1776 it became urgent to see if Canada would join the Colonies in throwing off the

English yoke, and Carroll was chosen to travel with Benjamin Franklin to Montreal. John Adams approved the choice: ". . . he is well acquainted with the French nation. He speaks their language as easily as ours . . . of more consequence he was educated in the Roman Catholic religion. . . . In the cause of American liberty his zeal, fortitude and perseverence have been so conspicuous . . . but he continues to hazard his all, his immense fortune, his life."

The mission failed, as Canada wanted no part of the Revolution, but Carroll's journal shows he obtained a grasp of military affairs which was to stand him in good stead. Hardly had he returned in June when he was off to Philadelphia, this time a full-fledged delegate, appointed to the Board of War. From then on his eminence grew along with his involvements.

He signed the Declaration, dealt with the finances and logistics of General Washington's army, and attended sessions of the Maryland Assembly as well as Congress. There was talk of sending him to Paris, again with Franklin, to negotiate the French alliance. He did not go but communicated with old friends abroad to smooth Franklin's path. Again, he helped quell the Conway Cabal which might have unseated George Washington.

In 1781 and 1782 Carroll's immediate family was decimated. The gentle Rachel, his mother-in-law, died, then his father—a redoubtable patriarch of 80—fell off the porch of his Annapolis residence and broke his neck. The shock of this accident sent Molly in retreat to her room. Only 33, she had borne seven children, lost three, and swallowed too often the laudanum prescribed for pains of births and illness. She never emerged again. Within weeks she was dead.

Retirement to Doughoregan and private life

Carroll of Carrollton sat for 23 years in the Maryland Senate, and served in the U.S. Senate too until law prohibited the holding of both offices simultaneously. He was glad to leave New York where "We have sat long, done nothing of moment, and have spent the state's money idly and unprofitably." He had favored locating the nation's new capital "on the Pohvomach" (Potomac), believing this would add dignity and stature to Maryland, but he preferred life at Doughoregan Manor where he was now growing wheat instead of tobacco, liming and manuring his fields to prevent depletion of the soil. He housed 300 slaves as well or better than his white tenants, and manumitted some of them. He helped persuade Maryland, considered a "doubtful" state, to ratify the Articles of Confederation and the U.S. Constitution, and played a dominant role in writing the state's conservative constitution. He lobbied to erase the last of the anti-Catholic laws.

Courtesy The Baltimore Museum of Art

The signer's only son, Charles Carroll of Homewood. His estate is part of Johns Hopkins.

No religion should be forced on anyone. He once wrote, "I am as averse to having religion crammed down people's throat as a proclamation."

He didn't like Jefferson, had not much faith in "the people" and believed with all the fervor of an educated aristocrat that the upper classes were abler at ruling than the ignorant mob. The year Jefferson was elected President (1800) saw Carroll defeated for the first time. He retired from politics.

The last third of Carroll's life was almost serene; the master of Doughoregan ("house of kings"—an old Gaelic word) tended his peach trees, kept meticulous books, received streams of visitors and taught his grandchildren and *their* children French. He was an indulgent father who gave each of his three offspring $10,000 a year, but was dismayed at their extravagances and frequently had to bail his sons-in-law out of debt. His only son, Charles Carroll of Homewood, gave up the Church and took up drink, held no positions to speak of, cost his father much in cash and anxiety, and died in 1825.

Of the two surviving daughters, Mary married a transplanted Englishman, Richard Caton, and in her turn produced four lovely girls, three of whom—"the American graces"—sailed off to London to enchant court circles and capture titled husbands. Louisa's wedding to Sir Felton Hervey-Bathurst, aide-de-camp

to the Duke of Wellington, topped London's social season in 1817; the great Duke himself gave her away. Marianne married the Duke's own brother, the Marquess Wellesley, a former governor-general of India, while Elizabeth married Baron Stafford in 1836.

The fourth Caton daughter, Emily, stayed in Maryland and was her grandfather's favorite.

With the deaths of Jefferson and Adams in 1826, Carroll became the last living signer; his face adorns a medal struck to commemorate the nation's 50th and his 90th year. In 1828 he was coaxed out of retirement to lay the cornerstone of the first Baltimore and Ohio Railroad station—he had helped finance this line. He retained his mental vigor virtually to the end, and died peacefully in November 1832.

He was buried in the chapel which forms the north wing of Doughoregan Manor; several other Carrolls have followed him there. The manor, reduced to 2,500 acres today from its 13,500-acre sprawl in the signer's time, is still a private estate, occupied by an eighth-generation descendant.

An interesting picture of life at Doughoregan in 1827 is afforded by a letter, from a young man who visited the manor on Carroll's 90th birthday, which was published by the Maryland Historical Society:

"[We] drove up to the Manor which is sixteen miles from Baltimore. . . . We found the family there expecting us, and joined old Mr. Carroll & two or three other gentlemen at the dinner table; he is a nice little old man with a sharp face, not very thin, & gay benevolent face—his hair is very white & long being tied with a ribbon behind. He wears drab breeches & worsted stockings, with an old fashioned waistcoat with long pockets hanging down, a large wrapper or cloak . . . which he tucks up & holds round him as he walks, so as to look quite funny. His conversation is very lively . . . he seems to take great interest in all that is going on, mixing a great deal with the family. . . . The whole place is a sample of southern hospitality on its greatest scale as to carelessness & kindness though not as to splendour which certainly never is thought about."

The visitor continues his description of a haphazard, unpretentious garden and many-roomed house bustling with family and a dozen houseguests, eating and chatting in one room, playing cards in another, singing to a harp and guitar in still another, or lolling among books and newspapers in a fourth. "Everybody seems to catch in ten minutes all the freedom & ease of the place. . . . There are guns & you may go to shoot, there are horses and you may ride—a bath & you can bathe. You stay a day or a week, welcomed when you come and going away at any hour you choose."

The birthday was "a grand gala . . . . the guests from around poured in . . . forty-four persons sat down to table, we had glorious saddles of venison & mutton, plum puddings, & substantials as well as *Kickshaws* of all sorts—after dinner the old gentleman drank two glasses of champagne—and then left his grandson Charles Carroll to do the honours. . . ."

And when the squire of Doughoregan retired, a guest rose to give this felicitous toast: "May public & private virtue be crowned ever as now with the garland of years."

Courtesy National Gallery of Art

Courtesy John D. Schapiro

Molly Carroll, Charles' wife, was painted shortly before her death at 33. Chester Harding's portrait of the signer was done late in Carroll's life.

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Michelangelo's last painting: his gift to this century

By Leo Steinberg

The Crucifixion of St. Peter, *belittled for years, is now recognized as a profound testament of the artist's spiritual journey*

Photographs by Ronald Sheridan

During the first 400 years of its existence, the *Crucifixion of Peter* in the Cappella Paolina of the Vatican Palace remained the least known and least loved of Michelangelo's works. But the artist was 75 when he finished it, and if the fresco seemed, as even his friend Vasari conceded, devoid of all charms of art, the blame could be laid on Michelangelo's failing powers and presumed apathy toward an unwanted papal commission. Such, at any rate, was the prevailing opinion until a generation ago. The work seemed so rigid in composition, so eerie in color and so negligent in execution, that Michelangelo's admirers thought it more charitable to look away, lest they be forced to dwell unfeelingly on the tragic decline of a great man. The *Crucifixion* fresco (along with its companion, the *Conversion of Paul*) was left to become Michelangelo's gift to this century. Restoring the picture to its native power and eloquence in 1975, the 500th anniversary of his birth, is our gift to Michelangelo.

To begin with the subject: So far from being an assigned task executed without inward commitment, it turns out to have been the artist's own choice. For there is evidence that the subject originally planned as the counterpart to the *Conversion of Paul* was not Peter's martyrdom, but one far more suitable to the role of the chapel.

The construction of the Pauline Chapel (p. 76), begun by order of Pope Paul III in 1537, coincides with the years of maximum peril for the Roman See—with half of Christendom defecting to Protestantism and calling the papal power a usurpation. The Pauline Chapel was conceived in defiant response. Intended to serve as the Chapel of the Conclave, the place where future popes would be created, it was to display the twin founders of the Roman Church as they receive their respective commissions from Christ: St. Paul called to the Apostolate on the road to Damascus, and St. Peter receiving from Christ the keys of the Kingdom. Indeed, Vasari, who completed his first Michelangelo biography in 1546 just before the latter fresco was started, states that the master was at that moment painting the "Delivery of the Keys." Yet the subject was changed—and changed to one which, in its traditional aspect, was inappropriate to the role and the scale of the Chapel.

Consider the story. Its origin is post-Biblical. St. Jerome refers to it briefly in the first of his *Lives of Illustrious Men:*

> [Peter] pushed on to Rome . . . and held the sacerdotal chair there for twenty-five years until the last,

Detail shows the vigorous, clockwise wheeling motion of the central element in the composition.

that is the fourteenth year of Nero. At his hands he received the crown of martyrdom being nailed to the cross with his head downwards . . . and his feet raised on high, asserting that he was unworthy to be crucified in the same manner as his Lord.

"For so he had demanded to suffer," wrote Origen. According to these reticent Fathers, it is the heart of the story that what the ancients regarded as an aggravation of punishment was incurred voluntarily—from simple humility. But in the apocryphal *Acts of Peter* the martyr's motives become more complex, and more preacherly. Nailed down with feet uppermost, Peter is made to deliver a sermon; he expounds the symbolism of the cross, explains his inverted posture as a similitude of the manner of human birth and the hoisting of his feet as indicating his destination in heaven. In Jacopo da Voragine's *Golden Legend* (13th century), these received fantasies were gathered up and transmitted to Renaissance readers:

> And when Peter came in sight of the cross, he said: "My master came down from Heaven to earth, and so was lifted up on the Cross. But I, whom He has deigned to call from earth to Heaven, wish to be crucified with my head toward the earth and my feet pointing to heaven. Crucify me head downwards, for I am not worthy to die as my Master died." And so it was done: the cross was turned, so that he was fixed to it head downwards. At this the crowd was enraged, and wished to kill Nero and the prefect, and deliver the Apostle; but he besought them not to hinder his martyrdom. Then God opened the eyes of those who wept, and they saw angels standing in their midst, and . . . he began to speak from the cross: "Lord, I have desired to follow Thee, but I did not wish to be crucified upright. Thou alone art erect, upright, and high. We are children of Adam, whose head was bowed to the ground; his fall denoted the manner which men are born, for we are born in such wise that we are let fall prone upon the ground."

The speeches which these medieval legends impute to St. Peter are typical of the nonvisual imagination. That Peter in his predicament is made to expatiate on the symbolism of the cross is unlikely enough. The analogy with the posture of human birth is an infelicitous verbal conceit. And the notion that feet pointing skyward imply a destination in heaven may be rhetorically effective, but it remains an unrealized image: In the corpus of Christian imagery, no one ascends to heaven feet first. Visually, an upside-down figure heads for the ground, and no representation of Peter crucified succeeds in suggesting a heaven-bent course half so well as does one pair of eyes glancing upward. Visualizations of Peter's inverted posture are thus necessarily at odds with the spiritual significance claimed for it. Which may explain why pictorial representations of his crucifixion are comparatively infrequent, why they were kept small in scale as mere visual mementos, or else presented within a narrative sequence, so that the Saint's exaltation in heaven could immediately follow. It must have been generally understood that a man upside down is not only in torment, but that his humanity is impaired; that an inverted face becomes incommunicative. In short, Peter's death as a heroic exemplum could be preached and meditated upon; but it had little to gain by being depicted.

Between the literary accounts of the martyrdom and the pictorial tradition there lies a graver discrepancy. What the legend projects most insistently is the commanding will of the victim. It is Peter's *wish* to be martyred feet uppermost, and the henchmen turn the cross at his bidding. And when the friendly crowd moves to intervene on his behalf, it is he who orders them to desist. Throughout the story he has his will. But in all earlier pictures of St. Peter crucified, the victim, invariably rigid and perpendicular, remains inert. Artists could dignify the Apostle by making him large, by centering him in the field, and by endowing

Crucifixion fresco in the Pauline Chapel. Companion piece, the *Conversion of Paul,* is on opposite wall.

This article was adapted by the author from the final chapter of his new book, Michelangelo's last paintings *(Oxford University Press). He is currently the Benjamin Franklin Professor of the History of Art at the University of Pennsylvania.*

Cappella Paolina, Vatican Palace

At first glance a confused tangle of massive, slow-moving figures, the *Crucifixion of St. Peter* is in reality an intricate composition organized for maximum symbolic meaning. Three streams of humanity enter the scene to spiral around the central drama: at lower left, soldiers; above them, horsemen and the prefect; and at the right, generations of witnesses filing past. The Cappella Paolina is not open to the public, so that few Vatican visitors have seen the fresco.

him with the steadfastness of a pillar; but none thought it possible to show the inverted man manipulating his situation or willing the motions of his executioners. Nor could such a conception arise except in the mind of that artist who habitually conceived of suffering as a state of being, and a resource of strength. Only Michelangelo could have envisioned the crucifixion of Peter as sufficient to a vast mural painting. Only as he reinvented it did the humbling martyrdom of the Prince of Apostles become conformable to the sovereign claims of his See.

Of course, the change of program from the Charge to St. Peter to his crucifixion required approval from Paul III; and the sense the Roman Church then had of struggling against peril and persecution must have lent a welcome symbolic dimension to the image of the martyred Apostle. But Michelangelo must first have assured the pope that he could rescue the theme, that he could render St. Peter crucified heels over head yet indomitable and dominant.

Instead of presenting the cross already planted, Michelangelo's narrative recedes to the moment of preparation. By activating the event into an elevation of the cross; by making the powerful wrench and the foreshortening of Peter's torso disguise a gigantic aggrandizement of proportions; by letting the center revolve in obedience to the vigorous clockwise turn of Peter's head and extended arms (detail, pp. 74-75), and by giving the victim such fierce alertness of gesture that all other motions in the fresco seem by comparison dazed and half-hearted, Michelangelo could, for the first time in a thousand years, verify what those apocryphal words had been claiming: the Apostle's agony as the triumph of a superior will.

One's first sight of the *Crucifixion* is chilling: Many are gathered here, and much is at stake, yet all is stillness and oppressive slow motion (p. 77). Perfectly centered, constrained to symmetry, 50 colossal figures bestride a contracting space. Almost incomprehensible is the landscape that serves as their setting: wastelands and barren rocks, yet with carved steps in them—intimations of long-trodden tracks. The horizon hangs high, which normally indicates an elevated eye level. Yet everything in the fresco looms overhead, and St. Peter's glance nails us where we stand below him on the Chapel floor.

This effect is the more remarkable since Michelangelo's figures, which are usually self-absorbed or entangled in groups, tend to avoid eye contact with the observer. Among the thousand creatures of Michelangelo's sculpture and painting, a bare half-dozen acknowledge the viewer's presence. All the more significant, then, that the whole *Crucifixion* fresco converges upon the protagonist's outright glance.

Is that stern glance aimed at the viewer? Or at the purple dignitaries of the Sacred College, of whom one will pass into the apostolic succession under St. Peter's gaze? Peter himself, by a fanatic contraction of the abdominal muscles, projects his trunk toward the beholder, rousing and twisting his upper body in order to see. No human body ever summoned such strength for the exertion of looking—not to fix his executioners, nor to regard his friends, but to engage every newcomer, every approach. Within the Chapel's space, Peter's commanding eyes represent—like the Church he personifies—an all-seeing, all-summoning power.

"On this rock I will build my Church"

The ancient symbolic equation of St. Peter and Church is implicit in the design of the fresco, above all in the relationship of the protagonist to the terrain. Peter is being crucified on a rock, a high, roughly cylindrical knoll, which his body seems to span lengthwise and crosswise. The outspread arms touch the circumscribed circle, so that the ambit of Peter's extended limbs coincides with his rock. In an almost hallucinatory effect of illusionism, his figure becomes coextensive with the rock of his martyrdom. And the prominent isolation of Peter's rock, its scale so nearly congruent with the reach of his body, compels us to *see* what we know—that Peter's name signifies "rock," and that he had heard Jesus say to him: "Thou art Peter *(Tu es Petrus)* and on this rock *(super hanc petram)* I will build my Church" (Matt. 16:18). Michelangelo puns with Christ. The rock at the core of the fresco associates itself with St. Peter in the entirety of his Christian signification—with his name, his ministry, his martyrdom as first Bishop of Rome and, ultimately, with the Church's foundation.

If Peter's rock symbolizes the Church, how many should gather about it? We see Peter attended by ex-

In this detail, a young workman uses his hand to hollow out the hole prepared for the cross, recalling a similar hole in the floor of the crypt of the Tempietto, traditional site of Peter's martyrdom.

Duomo, Florence

The mourner in the Florence Cathedral's large *Pietà* is a known self-portrait of Michelangelo.

ecutioners and watched by sympathetic bystanders above and below; all the rest are arriving. The humanity that builds up the solid sides of Michelangelo's composition is formed of three incoming streams, each open-ended as though indefinitely prolonged; each one revealed only as the vanguard of a host whose origin and extent remain hidden. At lower left, the soldiers come to the scene with leaden tread, wearied men finishing a long trek. One of them turns, slowed perhaps by indecision, but is pushed on by a collective momentum, as if there were more behind mounting the slope. On the plateau above are the horsemen, but what we see is no more than the van of a cavalcade broaching the field. Then, on the right, the procession from behind the hill—generations of witnesses filing past. We see their passing but not the length of their train; it is their defining trait to belong to a march without limits. The three groups spiral inward like the vanes of a pinwheel: a confluence of processions from deep, wide and far—each bringing endlessness to the site of the rock.

At the center, seven men busy themselves with the cross. On the literal, narrative level their work is mechanical. The far end of the cross has just been raised off the ground, a bearded foreman in a red leather cap directs the proceedings; he lends a hand and indicates with his left that all hands together be ready to lift the great weight diagonally so that it may be planted—inserted into the hole being dug for it at bottom center. But this functional reading is contradicted by a circular motion; we are shown that the cross is being rotated rather than raised. The rotation seems generated by the powerful swerve of the Apostle. It is confirmed by the two young henchmen at the cross-beam—one of them striding forward, the other bent over toward us. It is stressed again by the foreman's arms and sustained by all the rest of the group. There is no doubting the visual evidence that all these motions revolve together on a circular track.

How strangely they move, these executioners. Not one of them seems to grip firmly, or to take hold of the heavy cross with both hands (refer again to detail, pp. 74-75). These strong men submit to their tasks with expressions and motions that are either overdetached or overemphatic. They participate in rounding the circle as much as in raising the cross; each lending one hand while reserving the other, as if turning a mill-wheel, or performing a rite, or rehearsing a dance. The formalized round of their motion suggests submission to a set course.

In the context of Peter's martyrdom under Nero in Rome, the circular motion at center calls up a precise and concrete association: It reminds us that, in Michelangelo's day, the crucifixion of Peter was believed to have taken place on the Janiculum—one of the crests of that western range that comprised the *mons vaticanus*. And there, on the Montorio, or "Golden Hill," enclosed by the court of S. Pietro in Montorio, the supposed site of the martyrdom was marked by a small, round, free-standing monument, Bramante's celebrated Tempietto. In the mid-16th century, Bramante's memorial chapel would have leaped to the

This head from the *Crucifixion* appears to be a self-portrait of Michelangelo in early middle age.

mind of any Roman whenever he thought of the locale of St. Peter's death. And this ineluctable association turns the strange wheeling motion of the executioners into a topographical clue. It is as though these men, acting under a superior compulsion, were tracing the circular plan of the monument that would commemorate the site of the crucifixion.

A recent study by Philipp Fehl, "identifying the locale of the action," explores further connections between the staging of the event in the fresco and the situation of the Tempietto. Fehl suggests that the upright scaffolding of the depicted space evokes the steep climb required to reach the Montorio. And he offers a compelling interpretation for the youth at the lower center. Bramante's Tempietto, he points out, includes a lower chapel—originally an underground cave which, by 1500, had been equipped with an altar. The pavement of this substructure has an opening in the middle—"suggesting to the imagination the place of the insertion of the cross, that is, the hole into which, in Michelangelo's painting, the young man inserts his hand (p. 79). Worshippers at the site are, to this day, enjoined to bend down and touch with their hands . . . some of the gold-colored sand of Montorio which fills the enclosure." Thus, in the fresco, the youth's action alludes, beyond its immediate dramatic function, to an abiding ritual practice.

Finally, Fehl observes that the place of St. Peter's martyrdom had been singled out from time immemorial for meditation; which suggests that the marchers at right of the fresco are the first in a never-ending procession of pilgrims and worshippers. The fresco, then, is "Michelangelo's own visual meditation at the site." And the locale of the action, infinitely projected through time, connects the historic moment with the viewer's own present.

The meaning of the event as a rite of foundation and an affirmation of faith is expressed again in the tectonic character of the design: It has the foursquare solemnity composers give to the *Credo*. Throughout the field, the *dramatis personae* seem to build the space into a solid front. The component groups—the soldiers at the lower left, the horsemen, the friendly chorus at upper center, the marchers in echelon descending at right, and the huddle of women below—all form compact rectangular units. The groups bond like huge building blocks, consolidating the margins into two massive piers with the rotation of Peter's cross enarched between them, as if the crucifixion were set within a triumphal gate. Hence the stony austerity of the composition; the entire scene petrifies in the shape of a monument.

The motions within the fresco—the rise and fall at the sides and the revolution at center—these, too, are prefigured in Michelangelo's architectural thinking. They recall his staircase designs that show straight flights of steps at the sides flanking a curved central feature. Something of the hierarchical structure and congealed dynamism of Michelangelo's staircases inheres again in the fresco.

Activity and contemplation

But the picture departs from the abstract symmetry of those projects by its humane differentiation of left and right. On one side, all the men are on duty, variously involved in the action. On the other, untouched by the action, the marchers proceed as though the external event were an occasion only of inward experience. Left and right side thus unbalance the outward symmetry of the design by setting forth the old Christian polarity of activity and contemplation. Yet even here we are reminded of an architectural precedent: Michelangelo's final design for the tomb of Julius II, composed as a monumentalized triptych. On the tomb, the central figure of Moses—like St. Peter a ruler, founder and seer—is flanked by the statues of Leah and Rachel, the Old Testament sisters who, like the Martha and Mary of the New Testament, symbolize the active and the contemplative life.

Next to Michelangelo's self-portrait (p. 81) is the idealized Roman profile of the Prefect Agrippa.

One penetrates the picture by stages, in a series of spiritual exercises. Seen as a stable structure, the massed figures present themselves as two lateral piers buttressing a connecting arch. If one follows the main processional movements within the structure, they read, as do Michelangelo's visions of stairs, as ascents and descents framing a rotary motion. And if one looks at the dramatic occasion, it becomes a projection of moral choice between action and abstention from action. Into the historical episode, and suffusing its architectural structure, Michelangelo injected his own moral dilemma.

The contrasting of action and contemplation had always been part of his symbolism. But on the Julius tomb in its final form (1545)—in the two sisters Michelangelo adjoined to the figure of Moses—the old conventional personifications became acutely personal. Rather than symbolizing the traditional dualism of Faith and Charity, love of God and love of neighbor, they express a melancholy dichotomy between labor and vision—mournful fertility beggared by the exaltation of divine knowledge.

Here Michelangelo located the central conflict of his moral life. During the 1530s he had undergone a profound religious conversion. In 1546 he had reluctantly taken charge of St. Peter's Basilica to become, like Martha, "anxious and troubled about many things." He had done so *per amor di Dio*—for the love of God. Yet the artist and the religious convert remained at odds in his soul. His lifelong artistic activity became in retrospect a wasteful expenditure, a neglect of what Christ, speaking to Martha and Mary, had called "the better part" and "the one thing needful." Four years after finishing the Pauline frescoes, his most famous sonnet weighs his life's habit against the direct contemplation of God and finds it wanting:

To paint and carve no longer calms
the soul turned to that Love divine
Who to embrace us on the cross opens his arms.

But Michelangelo's avowed nostalgia for a life of visionary inaction is *retardataire,* harking back to the eremitic religiosity of the Middle Ages; it is as discordant with his own irrepressible creativity as with the spirit of the times. A modern scholar has argued that the distinguishing traits of the age of the Counter-Reformation were individualism and activism, and that the genius and the success of St. Ignatius Loyola consisted in his "embracing rather than fighting the general tendencies of his age. . . ."

In this sense, Michelangelo's working life, as opposed to his protestations, is as contemporary a phenomenon as the working life of Loyola. Paul III, who befriended Loyola and confirmed and encouraged the Jesuit Order, similarly "confirmed" and encouraged Michelangelo and kept him unceasingly occupied. Nor did the artist's energy slacken, so that invention continued to pour from him in abundance, and he would still be carving the *Rondanini Pietà* in his 90th year, 14 years later. In his last decade, "devotion" and divine contemplation became for Michelangelo, as for St. Ignatius, not a distinct form of activity but the tone of all his activity, including all drawing, designing and carving.

Meditating on Peter's martyrdom

But the *Crucifixion* fresco—and this may account for its chilling effect—projects a painful detachment from action, and not in the right-hand marchers alone: The henchmen about the cross revolve like somnambulists; the soldiers at the lower left come unwillingly; and the horsemen are too marginal in the design to activate a humanity given over to resignation.

Most remarkable in its stillness is the "chorus" of men at top center behind the cross. Can they be meant to represent the "enraged crowd" spoken of in the *Golden Legend*? There we read that after Peter's cross had been turned, the people were angry and that only Peter's command restrained them from slaying his executioner. But Michelangelo's fresco represents them unarmed and outnumbered, and with no inclination to move. No one stirs; no one cries out, nor lifts a hand to influence the course of events. As Michelangelo conceives the occasion, these friends were never tempted to intervene. Stilled and alert, they institute the time-

less discipline of meditating on Peter's martyrdom. And the painter, as he meditates on his subject, declares himself their successor.

Nor is this a rhetorical phrase, since all the religious painting of Michelangelo's later years incorporates his confessional presence. The two Pauline frescoes, no less than the *Last Judgment,* project the anxiety of a Christian conscience that knows itself steeped in sin yet hopes for the Grace of Heaven. In the *Last Judgment* fresco, completed just before those in the Cappella Paolina were undertaken, Michelangelo had limned his self-portrait within the flayed human skin held up to the gaze of Christ by St. Bartholomew; as if his wretched self were the first on trial.

The *Crucifixion of Peter* contains no such explicit self-portraits. Yet, among the 50-odd faces depicted, there are two that repeatedly and insistently strike observers as likenesses of the artist; not perfect resemblances in the sense of personalized portraits, but facial types into which a self-conscious artist would inevitably project a symbolic self-image. One of these is the ancient man in the Phrygian cap at the lower right (p. 77), stepping down with arms folded. The figure is evocative on many levels. Its dress and gait and mood of regret recall Roman statues of Barbarian captives. The captive as symbol of his human condition came readily to Michelangelo.

Some have seen a significant similarity between the graybeard in the fresco and the symbolic pilgrim on the reverse of Michelangelo's portrait medal by Leone Leoni. But the closest affinity is surely with Michelangelo's idealized self in the role of the mourner

The intensity with which this young man points to the Michelangelo figure and to St. Peter (both outside this detail) suggests that he is accusing the artist of joining the Apostle's crucifiers.

(p. 80) in the four-figure *Pietà* in the Florence Cathedral. This is the work that occupied his nights at home while he was painting his final fresco. It is not likely that the psychic resemblance between the carved and the painted figure would have escaped him.

The other head in which Michelangelo's features are recognizable is that of the horseman immediately behind the commanding officer at the upper left (p. 81). He seems about 40 years old and his beard is red—not Michelangelo's coloring. Yet the likeness of this head, dressed in the artist's characteristic turban, comes too close to authentic Michelangelo portraits to be dismissed as fortuitous.

But this gives us two Michelangelos. And as no man can be in two places at once, scholars have tended to accept only one or the other as representing Michelangelo's self; or else have dismissed both, since the case for either head as a self-portrait seems compromised by the fact that another pretender exists. But such rational arguments, applied to symbolic structures, are overly literal. Suppose we consider the "irrational" notion that both identifications are right. As the fresco in its entirety embodies simultaneities of then and now—the crucifixion as a historic moment and as the presage of its own afterlife and commemoration—so the artist, too, may be portrayed in the full span of his moral history. The turbaned rider then stands for a younger Michelangelo, or for Michelangelo's youth, and we shall find it significant that his place is under the Roman captain's command.

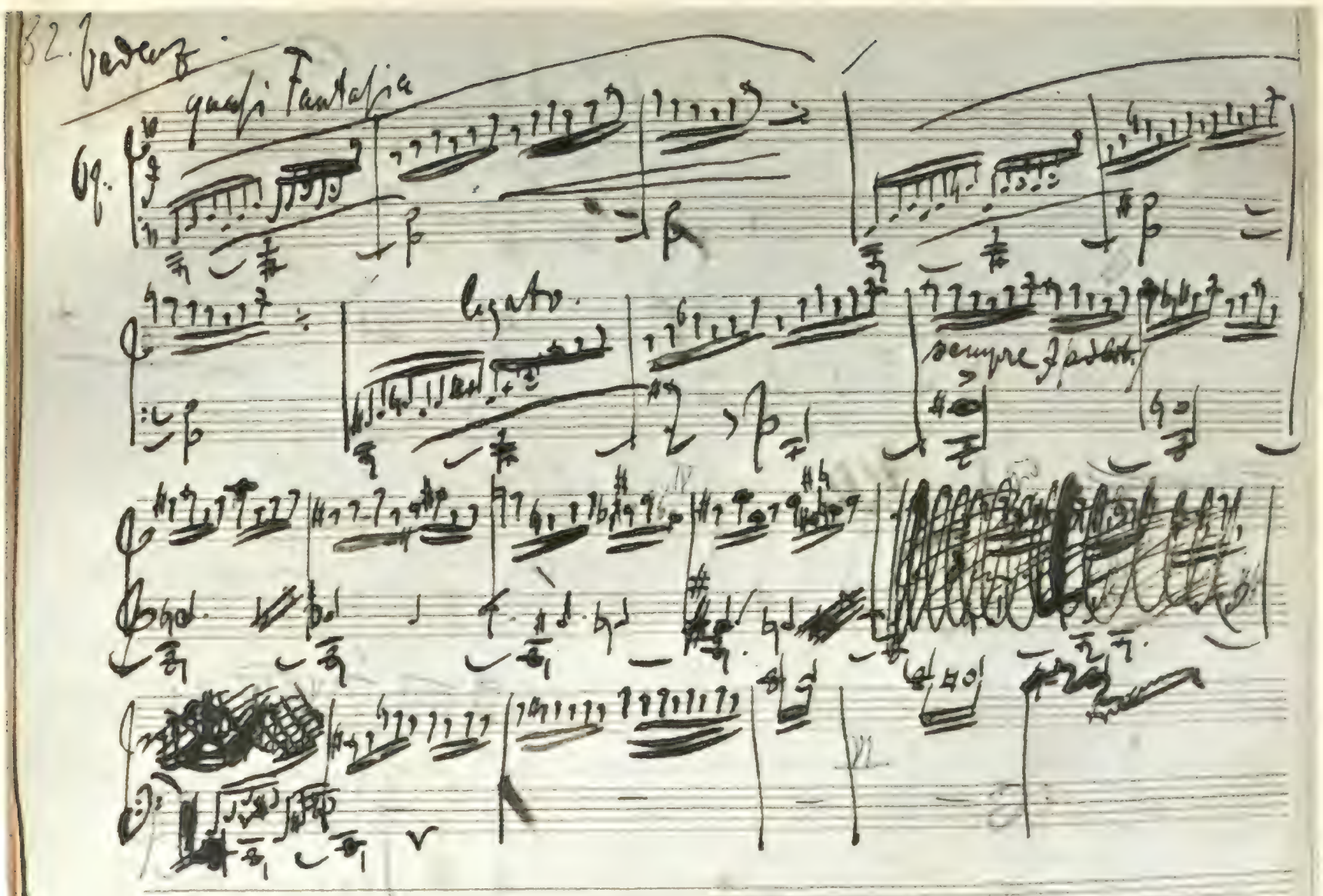
This Roman is not anonymous. In the *Acts of Peter* he is named the Prefect Agrippa and appears in a fairly good light: The Emperor Nero complained that he had not put Peter to death with greater torment. And his sovereign pagan face, too, is familiar. It is the clear-cut, square-jawed antique profile that Michelangelo reserves for his idealized Roman (p. 82).

The Prefect now assumes a two-fold role. On the narrative level and in relation to Peter, he is still the cool man of action, the officer in charge of the execution. But for the anxious rider behind him, whom we identify with Michelangelo, he is an embodiment of pagan antiquity, the perfection of masculine grace. And the painter has taken care to ensure that the two heads, crested and turbaned, are seen as a pair; for the interval between them is closed by the hand of another man, acting as a visual hyphen. The Prefect, then, not only commands Michelangelo, but stands between him and his Church.

Our musing is worth pursuing a while longer, because it deepens the sense of at least one other action within the picture, that of the chorus leader, the gargantuan, square-shouldered youth in pale green poised at the apex of the composition (p. 83). In a literal sense, he appears to protest the Apostle's ignominious execution to the Prefect; hence his pointing both ways. But for whose benefit is he pointing? To the captain in charge of the operation, the victim protagonist of the scene hardly needs to be pointed out. The artist has even averted the captain's head—clear signal that not he is being addressed. Aimed at the Prefect, the gesture of the chorus leader would remain timid, functionless, inadequate to the occasion. Yet the thrust of his fingers, his compacted shoulders and the glare of his eye bespeak fierce intensity. They suggest this more terrible charge—that the chorus leader directs his protest to the Michelangelo figure. For he points both to St. Peter and to where Michelangelo is spending his youth, as if to say, "They are crucifying the Apostle of Christ, and you keep their company?" The indictment that was haunting the artist's conscience is personified in the chorus leader.

If this reading is true, then the whole fresco turns into a chart of the artist's personal trial, like the *Last Judgment*. It is the descending graph of Michelangelo's destiny that runs, from his early idolization of a pagan ideal, from the vigorous upper left corner, down the imperious diagonal that begins in the Prefect's commanding arm and flows through the transverse beam of the cross, down to his own self again—himself in deepest old age. Arrived at the lower right and nearing his exit, he meditates on the death of the Apostle who had denied Christ and repented. And the arms of St. Peter's cross reach to connect the poles of Michelangelo's life—from his own denial of Christ to his present contrition. The work's innermost meaning flows in the geometry of its structure.

This powerful, profoundly grieving figure (lower right in fresco) represents the artist in old age.

The author descends steps leading to the long tunnels of Hitler's Bavarian aerie, where original Wagner manuscripts, a 50th birthday gift to the dictator, may yet be discovered in one of many sealed-off rooms.

An original manuscript by Ludwig van Beethoven, recovered after World War II, eloquently reflects the composer's tempestuous, volatile, never-satisfied nature. He often jabbed his pen through the paper.

By Carleton Smith

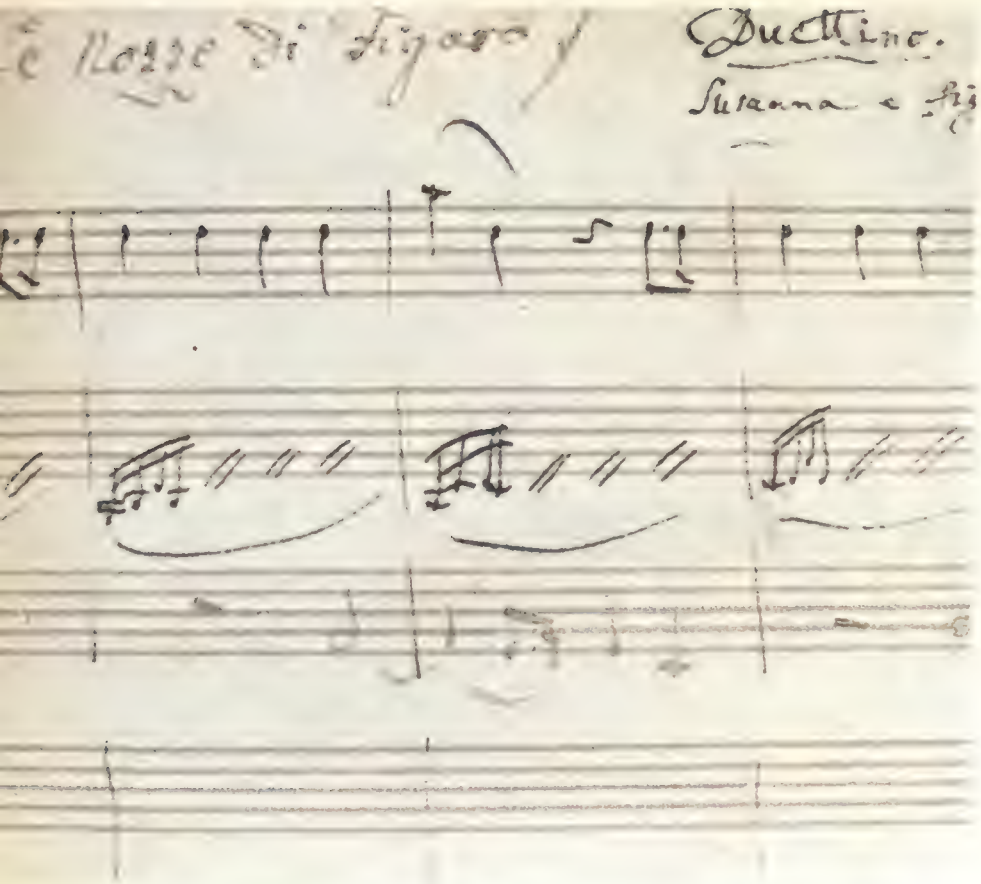
Tracking down original scores missing in the war

Many have been recovered, but the hunt still goes on in Berchtesgaden for Wagner's original music manuscripts that vanished with Hitler

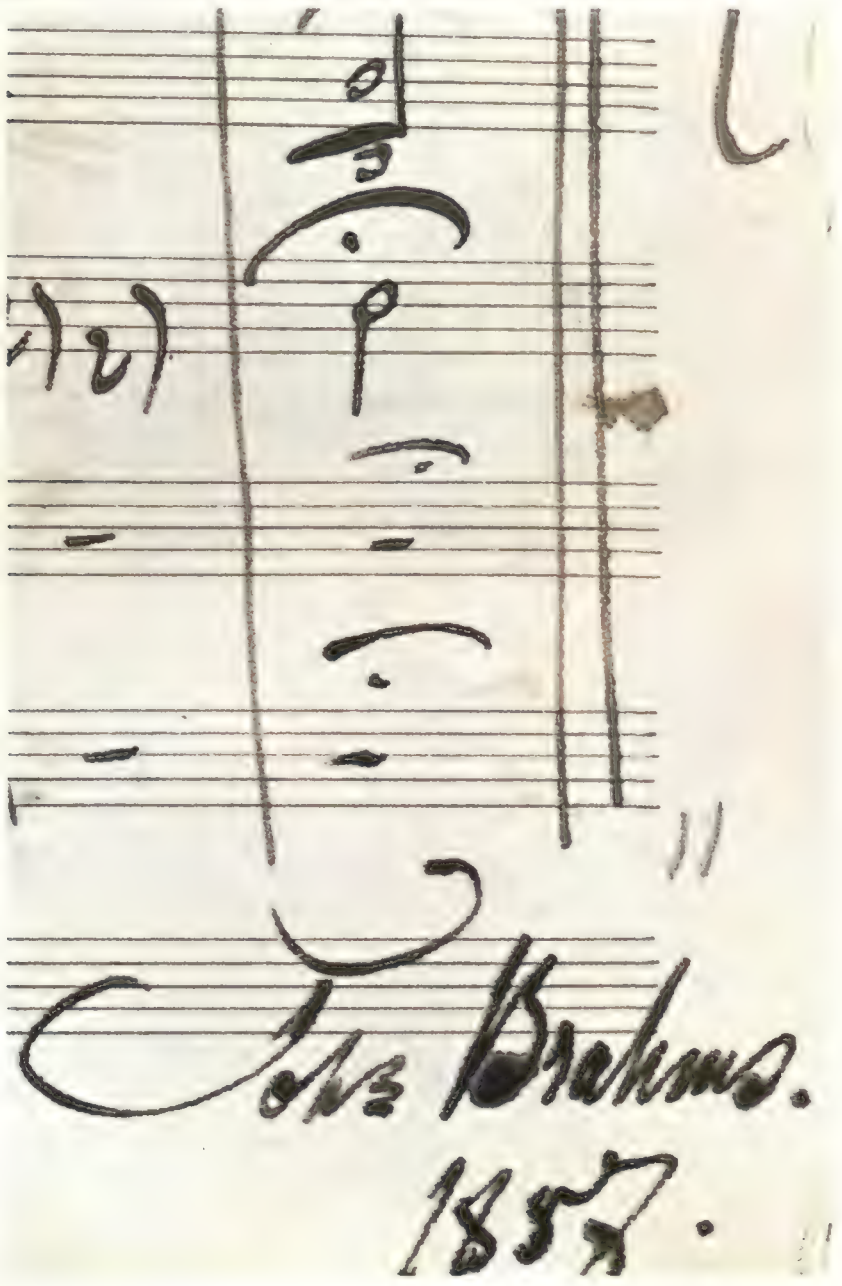
Few music lovers—even professionals—know that many of the Western world's most precious autograph music manuscripts disappeared during World War II. The original manuscripts of Beethoven's Seventh and Ninth symphonies and three of his last string quartets, a dozen Bach cantatas, four of Haydn's symphonies, a Brahms violin sonata, Mendelssohn's incidental music for *A Midsummer Night's Dream,* and nearly a hundred original scores in Mozart's handwriting, along with countless other masterpieces of our musical heritage, vanished. Most of them, fortunately, have now been recovered.

Before the outbreak of World War II, many of these treasures, as well as rare early printed music and medieval liturgical manuscripts, were preserved in the Music Division of the Prussian State Library on Unter den Linden in what is now East Berlin. But during the course of the war, the director and staff of the Music Division decided to break up the collection and salt it away for safekeeping in small university libraries, castles and monasteries in remote areas of the then Greater German Reich.

Photographs by Ralph Crane



The clear, straightforward nature of Mozart's work comes through (above) in a *Figaro* duet. And the broad, sweeping strokes (below) in which Brahms wrote are not unlike the majestic sound of his music.



It is fortunate for the future of the manuscripts that they did. The library was struck many times by bombs, and a colossal explosion occurred on February 16, 1944, when a blockbuster demolished the center of the building. In the final days of the war, the director of the library returned to the ruined building, took poison and died there.

On May 2, 1945, the Russians arrived. There was the usual looting that accompanies the advance of a conquering army and, had the great music manuscripts not been removed earlier, they would have been destroyed or carted off. After the war, several of the hiding places of the manuscripts were found in the French Zone of occupation and others in the American Zone. These manuscripts have subsequently been made available for study.

But when much of the library's treasures were being evacuated, the German army was still scoring some successes in the East and so by far the largest and most significant collections, including those mentioned, were deposited in St. Joseph's Benedictine Abbey in Grüssau (Kreznów), Silesia, now part of Poland. As soon as possible after the war's end, I traveled to Grüssau but the caskets containing the more than 1,500 manuscripts were gone. The abbot, Father Albert Schmidt, told me that soldiers had taken them "to the East."

Not everyone understands the true value of such autograph, or original, manuscripts. There are, after all, printed editions, which fill the needs of performers. Why, I am often asked, do you care about the original in the composer's own handwriting? A music manuscript, it would seem, is not as important as a painting or sculpture.

But for me there is something mystical and thrilling about a piece of paper that has received directly from the pen of a genius the fresh statement of his creative vision. Here we can study the origin of a dream, the changes, the crossings out, the afterthoughts, all of which contribute to the growth of a masterpiece. The original is often an immensely personal and graphic embodiment of a composer's musical imagination. I like to peer into a genius' workshop.

One doesn't have to go far into the dense jungle of Beethoven's manuscripts to know that this impetuous, impulsive hand—now and then stabbing the pen right through the paper—is far different from the clear, sure flow of Mozart or the orderly, even inspirations of Schubert.

Equally important, the original and the original alone is the ultimate arbiter of the composer's inten-

Carleton Smith, a onetime music critic, is both chairman of the National Arts Foundation in Liechtenstein and an adviser to J. Paul Getty.

tions, the indispensable source for the definitive interpretation of any piece of music. From it a thousand subtleties of phrasing, of style, of meaning and even of tempo emerge.

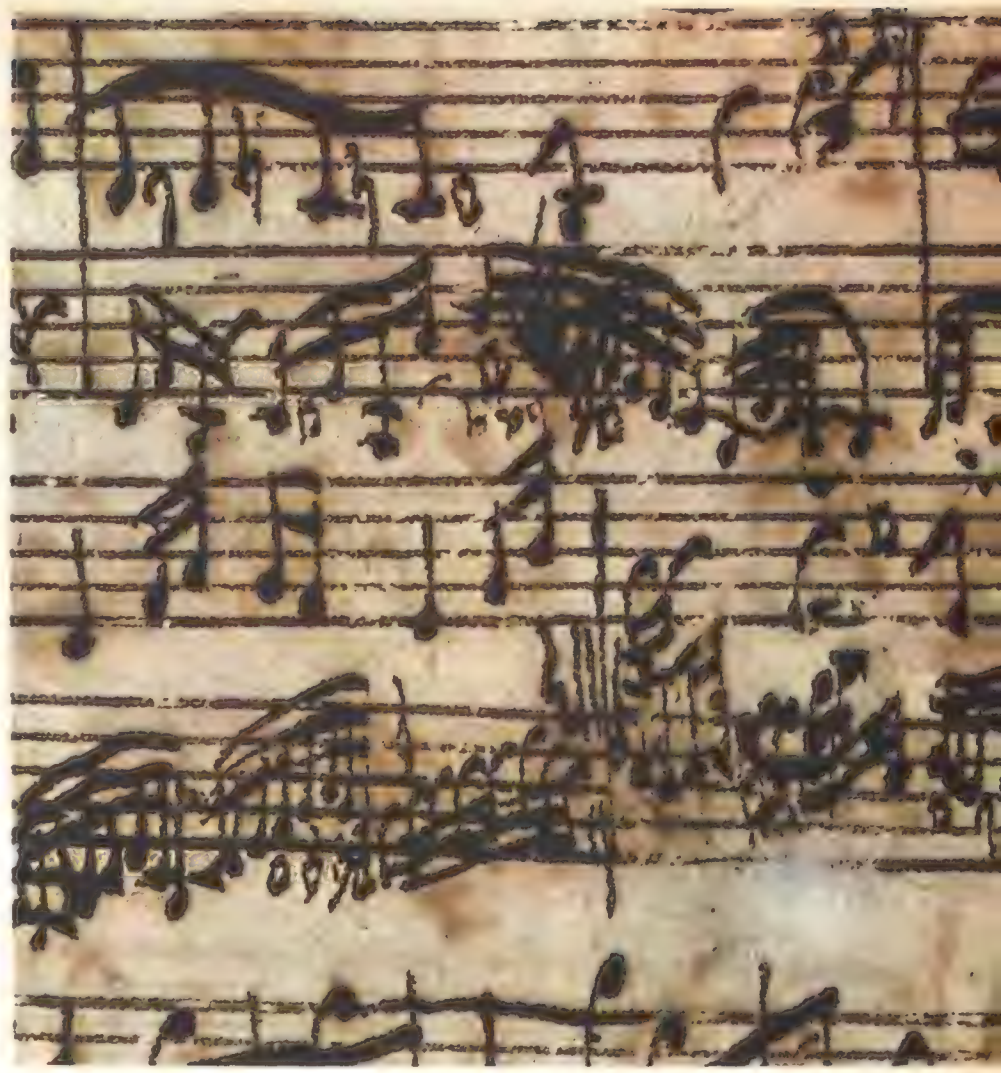
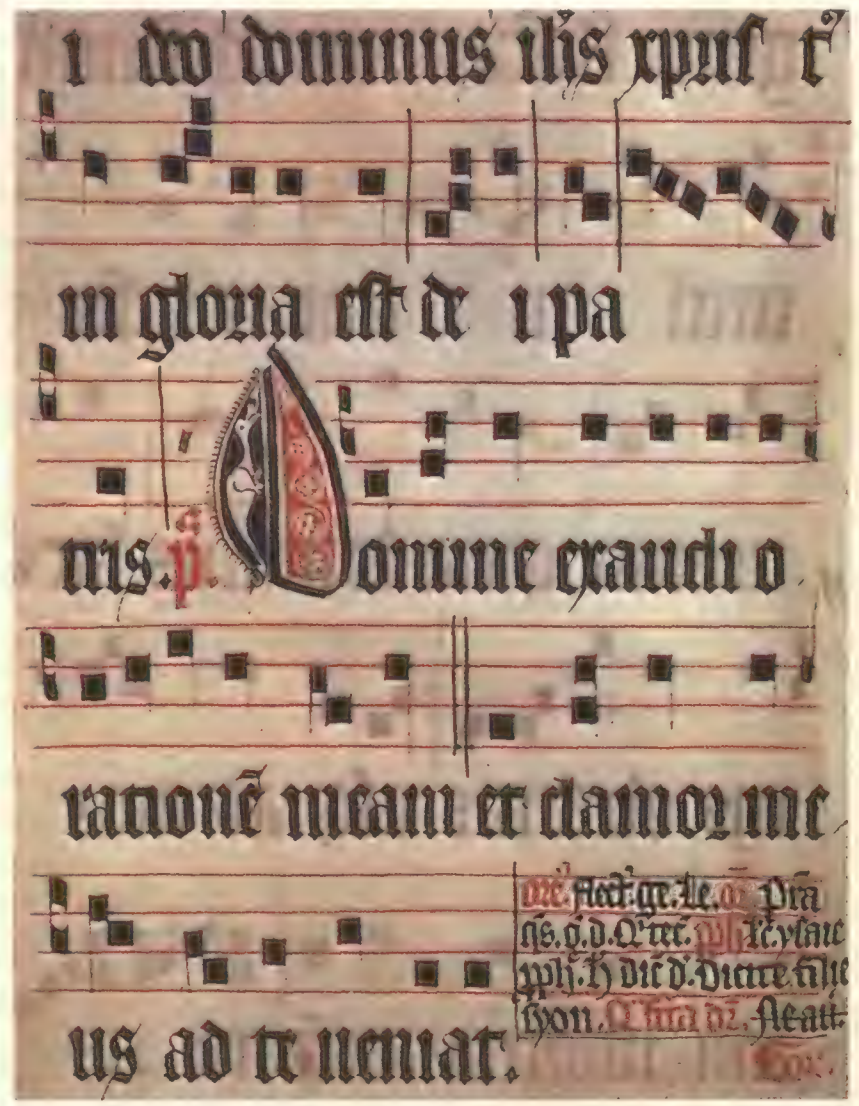
For example, until the metronome was introduced in 1816, a composer could give only a general indication of the tempo he preferred. Above one of Mozart's duets in *The Magic Flute,* he has written three different tempi and crossed out two. In the printed score only the tempo not crossed out is printed. By seeing the two he crossed out, one has a better idea of Mozart's intentions as to tempo, and on the tempo depends the meaning of the music. Today too much of our public music-making is not based on anything like the proper kind of study of the original intentions in the composer's manuscript.

It is good that more and more facsimile editions are being made available each year. The primary reason I started my search for the lost manuscripts was so that such facsimiles could be made of them and distributed widely. Also, I had known and studied them in Berlin in the 1930s and I had a personal desire simply to see them again.

The search begins in earnest

One American who knew full well the value of locating the manuscripts was Harry S. Truman. Shortly after his return from the Potsdam Conference in 1945, I had the good fortune to talk to him in the White House. He asked if I knew what could be done to find these missing treasures, and said he would see to it that scholars were instructed to search them out in the American Zone, which he did. He was also helpful in opening doors for me in the other occupied zones, and each time I saw him until his death, he never failed to inquire about the progress of our search.

With his help and that of expert researchers, I and later the staff of the National Arts Foundation of Liechtenstein traced every lead that came to us. The foundation employed musicologists, searchers, spies and informants in a dozen countries from Finland to Spain. My task was to supervise and coordinate their work. In all, hundreds of people—official and nonofficial—joined the search, working together or alone. Appeals were broadcast throughout Germany and the countries of Eastern Europe, offering rewards to anyone furnishing information that would help lead us to the Grüssau manuscripts.

We were told of secret caves in East Prussian castles, of an estate near Marienbad, of a monastery a few miles up the river from Krakow—and there were indeed a few manuscripts in some of these places, including one or two of Chopin's. But the great treasures of East Berlin remained missing.

In heavy, measured script (above) Bach constructed his towering tributes to the Christian faith. The liturgical manuscript fragment (below) shows the kind of musical notation that was used in Middle Ages.

For many years it was assumed they were in the Soviet Union. During a stay in the Berlin home of Ambassador Robert Murphy in 1948, I wrote an open letter to Stalin asking his help. No reply was received. But some years later, shortly after President Eisenhower met with Nikita Khrushchev, Marshal Bulganin, and others at the 1955 Summit Conference in Geneva, I visited the Soviet Union and was met at the railroad station in Moscow by a musicologist who interrogated me at length about my searches and current knowledge. He volunteered that the Grüssau manuscripts might be in Poland. All later efforts to contact this man were unsuccessful.

In recent years, still more rumors circulated that this priceless collection was in Poland. Several music experts said they knew the exact location. Responsible officials, including the foreign minister of Austria, asked their Polish counterparts for information; their inquiries were politely received but met with denials. Finally, the Polish institution in which the originals were said to be kept sent out requests for information about their whereabouts.

In the spring of 1974, some Polish associates told me that if I went to Poland and remained there for several weeks, they would arrange for me to inspect the manuscripts—but only on the condition that I would not say where they were or who had shown them to me. After endless preliminaries and being passed from one intermediary to the next, I was taken to the place where the the manuscripts are kept. The contents of two cases were shown to me. Holding these old manuscripts in my hands again after 40 years was like meeting one's first love after four decades, only the manuscripts have not aged. They have been carefully cared for and are in good condition.

Nevertheless, competent Polish authorities still do not admit their existence. It may be that the Poles wish to obtain from the Germans the return of some historical documents, and that eventually the lost music will be "officially" located and a mutually beneficial exchange will be effected.

The East German Minister of High Schools, who controls the present German State Library, has been shuttling back and forth to Poland. Negotiations are under way and one hopes, before too long, the manuscripts will be returned to East Berlin where each page can be photocopied and made available to scholars and music lovers everywhere.

And then the long search will be over—except for those manuscripts of Richard Wagner which, at the end of the war, were in the possession of Adolph Hitler. They include the original autograph copies of *Das Rheingold, Die Walküre, Rienzi, Die Feen* and *Das Liebesverbot,* along with the second copies of several other works. It is ironic that they are now missing precisely because of Hitler's love of Wagner's music.

During the 1930s, when I was a music critic and broadcaster for the National Broadcasting Company from Germany and Austria, I often saw Hitler at the annual Bayreuth Festival, where he attended every performance. There can be no doubt that Hitler was emotionally responsive to music—especially Wagner's. He played the piano and even tried to compose an opera. It is said that as a youth in Vienna he hid near

Six centuries of music manuscripts are in care of Karl Heinz Kohler of the German State Library.

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the windows of the great tenor Eric Schmedes, hoping to hear him practice *Lohengrin*. And, of course, Hitler must have known intuitively that the neuroses and paranoia in many of Wagner's music-dramas reinforced the German susceptibility to the myth of the "Master Race."

I recall an awkward moment when I asked Paul Joseph Goebbels if it were true that the composer Bizet had a Jewish ancestor. *Carmen,* then conducted in Berlin by Richard Strauss, was as popular in Nazi Germany as elsewhere though performances of works by Jews were strictly forbidden. Goebbels didn't know, but when he ultimately determined that it *might* have been so, he had Georges Bizet officially declared "an honorary Aryan."

The idiotic racial policies of the Nazis produced endless absurdities as well as bitter tragedies. When the famous Wedding March from Mendelssohn's incidental music to *A Midsummer Night's Dream* was forbidden to be played at German weddings, I inquired why. Certainly it was because Mendelssohn was a Jew. Not at all. I was informed that in Shakespeare's play the music accompanies the transformation of Bottom into an ass. It was decided that such a connection made it inappropriate music to be played during the wedding of a member of the "Master Race."

I understand that Hitler never aspired to own Wagner's original manuscripts. Those he received—and which are still missing—were given him on his 50th birthday by the German National Chamber of Commerce, which had purchased them from the estate of King Ludwig of Bavaria, to whom Wagner had given them as birthday and Christmas presents throughout the 1860s.

At first Hitler, who received countless birthday presents, thought he had facsimiles. It was not until he went to Bayreuth in July 1939 for the festival that Winifred Wagner, the composer's daughter-in-law, told him he actually had the originals. Hitler was, says Frau Wagner, "flabbergasted, speechless, overcome, beside himself with joy."

Later, when Frau Wagner pressed him to return the manuscripts to Bayreuth to be kept in Wagner's house, Hitler replied, "They will be safer with me than with you." The misfortune is that, of course, this did not turn out to be the case.

Winifred Wagner, born in England of Danish parents, married Siegfried Wagner and came to Bayreuth more than 60 years ago. She has done a superlative job safeguarding Wagner's manuscripts, prose writings, letters and memorabilia. During the war she transferred them all to a hospital where they were kept four stories underground. In 1973, she created the Richard Wagner Foundation of Bayreuth to preserve "his universal patrimony for all time." Had Hitler listened to her and followed her wishes the precious manuscripts would be safe today.

No one knows where they are now, or even if they exist. Albert Bormann, the brother of Martin, came to me one night in Munich and said he was certain they were not in Berlin at the war's end but had been stored elsewhere by his brother. Just where he did not know. Neither did Albert Speer, nor Hitler's personal adjutants, servants or chief cook. No one could give any new leads.

Winifred Wagner suggests that they might have been removed from Berlin and fallen into the hands of the Russians. Or they might have been held by Austrians and fallen into the hands of Americans. Ordinarily, Frau Wagner reasons, Hitler would have kept them near him and there is still a slight chance that they are even now hidden away in the bunkers built for him at Obersalzburg near Berchtesgaden. (It is an interesting coincidence that the old telephone book there lists the number for the private archives as the alternative number of Eva Braun's private bedroom.)

Cursory inspection of the bunkers suggests that there are hundreds of rooms and tunnels, now sealed up, in which the manuscripts might be hidden. During 1976, a team of German technical experts will use ultrasonic devices to locate all such cavities in an attempt to find the manuscripts. Should they be found, a generation of searching, which unearthed and restored more than 10,000 manuscripts and early printed scores, will come to an end and the musical heritage of Western man will once again, and hopefully for all time, be intact and available to the world.

In Bayreuth, Carleton Smith and Winifred Wagner go over plans to seek out lost Wagner originals.

Text and photographs by Roger Warner

Riding freights is no picnic for tramps today

There is one sure way to understand tramps and that is to join them—dodging bulls in freight yards, sharing mulligan in jungles

From an open boxcar halted between Tucson and Phoenix, a free rider gazes out at the desert in

Sunrise in Iowa. The rails, with their bare silver surface, creak and stretch in front of the train, as if being pulled down under a wave. Rails are passive. Under the weight they sag to the crossties, and the flanged wheels grind against them in the curves. The wheels click over the gaps between the lengths of track, two at a time, then two on the other side, eight to a car. A thousand wheels roll over the surface, polishing it, as the diesels draw their long load.

The locomotives with their long snouts and receding foreheads have a look of conscious intent. Four of them, in tandem, lead the charge around a curve, tilting inward, and from a window the engineer looks back to see if the rest of the train is still there. The caboose dangles behind, hurrying to keep up.

Between the locomotives and the caboose is a mile-long procession of boxcars, flatcars, piggybacks, gondolas, tankers, grain hoppers and auto racks, clasping one another with couplers that resemble metal hands. The coupler knuckles extend to arms within sleeves so the cars, as they jostle in line, may stretch apart and then pull back together with a bang.

This morning one of the open boxcars carries several men. They are railroad tramps. Nobody in authority knows they are there. In this giant caravan, they are as weightless as flies.

Ever since the great expansion of the railroads in the 19th century, these travelers—hoboes, tramps, migrants, sightseers—have fastened on for free rides. They are part of the spirit of the trains, like the cars and the track, which often they helped lay. Glimpsed, over the years, as the trains passed through towns, these anonymous, dirt-stained figures have acquired a halo of fame. Yet few people have ever known who they were. Few know now that their history goes back 100 years or forward to today. In regions of the West, during warm weather, as many as three out of four freight trains have tramps aboard. And as a tramp said recently, "Hell, as long as there's freight trains, wine and blood banks, we'll always be around." (There are some hospitals, research institutions and private blood banks across the country that pay donors an average of $15 for a pint of blood. Certain diseases, such as hepatitis, permanently disqualify donors.)

For tramps—a name they call themselves but don't like others to use—the pair in the boxcar are well-equipped. In the windless space forward of the doors, sheets of cardboard cushion their sleeping bags from the vibrating floor. A Clorox bottle of water and an empty jug of wine lie between them. Jim, the elder, wakes, pulls a set of dentures from his pocket, scrapes

100-degree heat. They may be hoboes, migratory workers following harvests, or just tramps.

the lint off them and fits them onto his gums. He gets to his feet, a lean man in janitorial clothes wearing a baseball cap over white hair. Dale, a round-faced man in khakis, rolls his first morning cigarette. The noise limits their talking, but it doesn't matter much. They are a cheerful pair, friendly and likable.

Jim and Dale, one week out of Omaha, have been seeking work gandy-dancing—fixing track—but they're not union members and nobody will hire them. Jim holds onto the doorway looking out. The faint barnyard odor around him rises from feed pellets scattered on the floor. The metal walls and roof pick up the clatter of the wheels and amplify it into a general roar.

All morning the Burlington Northern rolls through Iowa, past grain elevators and abandoned factory sidings and along a two-lane road. Toward noon it squeals to a halt in a yard and pressure goes off the brake hoses with a whoosh. They are going to set off some cars. It is finally quiet enough to talk, and Jim sits in the doorway making a cigarette. His grizzled face and clear eyes suggest wisdom learned the hard way. He says he started hopping freights back in the Depression, when the bulls, or railroad police, were a problem.

"Hell, I've had 'em march me up to the depot and shake me down. I ain't done a damn thing 'cept ride those trains and you'd think the FBI was after me." The bulls don't bother you too bad now, he says, and he lists the different railroads and the conditions on each. It appears that he has ridden freights all over the country and his knowledge of geography is phenomenal. For every place he has a story about the bulls, or some rough time or maybe a piece of good luck. Dale, who is younger, listens without speaking.

"I've rode the rods. Used to crawl up underneath them rods and hang on. 'Course they didn't go as fast as these diesels. I remember down in Fort Worth, in 1931, we had to walk 12 miles out to what we called 12-Mile Hill. See those old units had to get real slow to make it up that hill. He'd get down to about five miles

The author graduated from Yale last June and lives in California, where he is a free-lance writer.

Outside Yuma, a Mexican jumps for a car.
Once aboard, he'll quickly pull the door shut.

an hour and you'd catch him right there. These days this diesel sonofabitch goes up that hill like it isn't even there, going 50 miles an hour." He reminisces, exhaling from his Velvet brand home-rolled cigarette until there is a jolt, and the sound of air filling the brake hoses. The boxcar pulls forward with a screech of stretched couplings and rumbles out of the yards. A few more miles, then the Mississippi River and then the Omaha yards.

It is a long hike from the yards downtown and Jim takes off in the lead. For a 62-year-old man, he walks quickly, bent to one side with his gear. He makes a beeline for the nearest bar, where he and Dale pool their money for a bottle of sweet port in a brown paper bag. This is their reward. It does not matter that they have found no work or that they have barely a dollar between them. They discuss going to the blood bank in the morning. They sit in the shade and pass the bottle back and forth until it is gone. "Once you get that wine in your system," says Jim, "it wakes you up pretty good. Wine does more for me than coffee."

The day ends at the "Sally," or Salvation Army, a tall brick building next to the tracks. They enter with a grime peculiar to the freights, most noticeably where dirt recolors the beard. But after a shower and a shave, they sit down to dinner looking like anyone. The clean faces of the men around them, many of whom come off the freights, are as varied as a church congregation. Dale, with his pink skin and big ears, looks as plain and honest as a pork chop. Jim's leanness has given him a crocodilian look.

Just who is a tramp, anyway?

Now Omaha, Nebraska, is nowhere near the heart of freight-hopping country. Towns like Yuma, Salt Lake City and Spokane are more like it. But wherever you go you want to ask, "Who are tramps, really?" thinking that there is something esoteric about their motivations. The mind holds onto stereotypes and you do not want to admit that, under the dirt, tramps are much like the rest of us.

Not everybody on the trains is a tramp. The runaways and one-time riders are not. The Mexicans are not. College students and cowboys are not. And yet a core of orthodoxy runs from the old days to the present, and people like Jim and Dale fit it. In their nomadic job-hunting, their wine-drinking, they recall the stages of railroad migrancy as it has evolved.

Train-riding in this country began at the end of the Civil War. Among discharged soldiers were those who were homeless and others who couldn't readjust to domestic life after camping and fighting in the field. They roamed as vagabonds. Since highways of the time were full of potholes, it was easier to walk along the

Battered suitcase of this hobo held clean shirts. He was a sick man, fighting a high fever. Tramp at right cradles his own pet tramp.

graded, well-kept railroad rights-of-way. At some point a vet with tired feet must have been trudging along the tracks when a steam train came chuffing by—and what he did then launched a chain of events that has lasted right up to this day.

There were only a handful of these pioneer types, however. It took the Panic of 1873, with its millions of unemployed, to make the trains the basis of a life-style. With no unemployment insurance or welfare to keep them home, so many men took to walking about that the word tramp was invented to describe them. At the same time, the bolder ones learned to sneak into the railroad yards at night to catch rides.

Within a few years a hierarchy of these train-travelers had grown up. Hoboes worked and wandered, tramps drank and wandered, and bums, as the saying goes, drank and dreamed. Generally they were young, white and single and about half of them foreign-born. Women almost never rode the rails in the early days.

In the last quarter of the 19th century seasonal jobs like logging, ice sawing, sheepshearing, grain harvesting, railroad work and construction depended on transient laborers and drew them across country in tides. Migrant agricultural work was done by men off the freights—they had no other way to get around. Specialists known as fruit tramps followed the crops in a yearly circuit. The Midwest grain harvest in the summer inspired the greatest migration. Tens of thousands from farms, cities and immigration docks joined the regulars in the boxcars and on the roads. For once, railroad companies recognized the connection between the harvesters and the revenues made from hauling the grain. And so sometimes the bulls were called off.

It was railroad policy not to let anyone ride free. Moreover, freight-riding has always been illegal. Brakemen could literally kick someone off a moving car, and there were bulls who would take shots at anyone in sight. The mostly grisly practice was described by Jack London, who rode freights in the 1890s. A train crew would tie a coupling pin and lower it so that it bounced upwards from the ties. Anyone underneath on the rods would be beaten to a pulp. Other crews charged money for the ride.

No matter how they tried, the railroad companies couldn't stop the invasion. From 1893, when another onslaught of unemployed hit the freights, until the Depression, freight-riding had its heyday. Around it grew a subculture providing everything but work. Often a hobo would quit his job, go on a drunk and hit the road again. In winter he might come into the city skid rows, where there were cheap lodgings, second-hand stores and people to his liking. In spring when it was time to travel again, there were hiring agencies right on the spot.

On the road he could depend on finding jungles or encampments adjacent to the railroad yards. The jungles were run by democratic rules: Any man was welcome. Anyone could get something to eat, though if he had food he should add it to the mulligan, or stew. Mirrors, pots and pans were to be returned to their nails on the trees, and everything spotlessly cleaned for the next fellow.

An empty boxcar on the Southern Railway, between Birmingham and New Orleans, is home to these wanderers. During the Great Depression of the 1930s, entire families moved aboard the cars to find work.

In spite of that, road life was hard-bitten rather than heroic. There was always something to watch for, whether the law or another tramp making off with your shoes—a common occurrence. The jungles had their drugs, particularly whiskey and canned heat strained through cloth. When Prohibition ended, wine came in and quickly became predominant. Wine proved to have many uses: It kept you warm—a "Tokay blanket" for cold nights on a boxcar floor. But it also was sometimes viciously addictive. Many tramps blame wine for the condition of the jungles today.

One can say the long, gradual downfall of the freights began with the rise of the automobile, but it took a long time for the automobile to make its metamorphosis from a rich man's curiosity to a social necessity. After World War I another flood of veterans hit the rails, a million of them, according to hobo leaders. By the time this tapered off, the Depression had arrived. Unemployed men, teen-agers of both sexes and even families crowded into the boxcars. There would frequently be 150 or 200 on a train.

Fewer trains, fewer tramps

After World War II the wave of veterans was smaller. America was deeply into the age of the automobile and, just as important, the age of the trucking industry. The railroad network, laid out across the country like a giant circulatory system, withdrew first from its short lines and branch routes, its capillaries, and through failures and mergers back to its major intercity arteries. The diesel-electric engines introduced about that time stopped less often than the steam engines and pulled a longer line of cars. Continuously since then, there have been fewer trains to get on.

Coming into the Salt Lake City yards once, I met a group of fruit tramps waiting for a night train to take them to Oregon for the peaches. One of them brought a shaving kit out from his gear and they all used it in turn, lathering with soap instead of shaving cream and water from a culvert and peering into a little hand mirror. I tried the razor when they finished and found the blade still had an edge. They sat down, all clean, and talked cheerfully among the fire spots, tin cans, broken bottles and buzzing flies—the excrement of the jungles. Yard engines sent boxcars crashing into each other nearby. In the distance the city buildings jutted up against the backdrop of the Rocky Mountains. And above them towered, in the undecorated landscape, an overpass of the interstate highway.

I wanted to find out why they rode the freights instead of hitchhiking. One of them said it made him nervous standing there with traffic whizzing by. "You always know that old freight train's going to run, and you can rest easy while they're making it up." The

Near El Paso, a tramp waits patiently beside the track, his plastic water bottle beside him.
Gus, below, similarly waits at Alexandria, Virginia.

U.S. border patrol at El Paso nabs a Mexican teen-ager before he has a chance to hop a freight.

others, seated on overturned pails and rolled-up sleeping bags, nodded agreement.

Another man said, "Hell, if you hitchhike you never know who'll pick you up. If you see some guy in a boxcar you don't like you can ride someplace else." There is enough danger on the road, both the highways and the rails, for a tramp to be conservative about the company he keeps.

There were five or six of these fellows, and they each had a reason for staying on the freights. The last one said, "At least when you take the freights the goddam engineer won't get drunk and drive off the road, like those rubber tramps." This got a laugh. Rubber tramps, who drive automobiles, have a low standing with railroad tramps. There are stories of them driving away from the harvest, robbing their passengers and leaving them in the middle of nowhere. But not all rubber tramps are like that, and even these fruit tramps admitted that it is easier to get to a job when you have a car.

Today's freight riders depend on help from outside their culture. The skid rows are dying. The Salvation Army and the missions have taken the place of the jungles. Groceries are more likely to come from food stamps than from knocking on back doors. Welfare, pensions and blood banks provide income.

A frequently encountered type on the road is the pension tramp. Jim was one of these, returning to Omaha to wait for his Social Security check. Others have their checks forwarded to them in the mail, for greater mobility. Often these old-timers are good company. They know the road, and they wouldn't be riding on it at that age if they didn't have guts.

Many a pensioner has the same story to tell. Usually he has not been a lifelong traveler. He might have learned to hop freights in the Depression, when so many did, then after the war settled down with a career and a family. Then, perhaps, after the wife died, or the divorce (perhaps because of his alcoholism) came through, the relapse to the road struck. "Once you ride one freight you'll always go back," is the sorrowful saying in this fraternity. Old tramps meet up again years after their last encounter.

In boxcars in Bend, Oregon, and Oroville, California, among other places, I have heard men say that if their automobile hadn't broken down they wouldn't be here, and that by God when they get some money they'll get off the goddam rails. But others head toward the freights as a refuge. They remember how they could live on next to nothing on the freights, and other advantages, too. For the only pressure on a tramp is his survival. His only responsibility is to himself: "Hell, when I get a jug of that wine and some tobacco I guess I'm doing pretty good."

The younger tramps are a mixed batch. The ones that use the trains regularly, as commuters, are likely to be blood-bank artists and circle bums collecting welfare from several different cities. The occasional riders come in larger numbers and a wider variety. There is no way to catalog them: Put simply, some you like and some you don't.

Usual procedure is for patrolmen to send the lad back to Mexico—and for him to try it again.

Perhaps a night in the Spokane, Washington, yards gives an idea of the variety. Here I met a black homosexual with conked hair, two high school kids, some winos, a guy with a bicycle, his friend from Germany and a flock of Christian pilgrims, men and women, dressed in homemade robes. All were waiting for the train. There is reason to sleep lightly these days. Many tramps with gear to protect are now carrying guns.

The Mexicans, who are called illegal aliens by officials and wetbacks by most of the tramps, ride virtually every freight train heading north from the border. They also use automobiles and trucks. The older ones, as a rule, migrate to farms for the season while the younger ones hope for permanent jobs in the cities. The ones I met spoke little or no English, had little or no luggage—perhaps an extra shirt—and no money or food. At most they would have a container of water for the trip across the desert and some of them not even that. In addition they face our most thorough railroad police force, the U.S. border patrol.

In El Paso, Texas, Mexicans board trains at night when they are already moving. In that city, 8,208 of them were caught doing that in fiscal 1975, which indicates mostly that a lot more got away. Sometimes it all looks like a game: When the aliens are captured by the border patrol, they are released quickly in their native country only to try again until they succeed.

In El Paso, by presenting magazine credentials, I was allowed to go on night duty with border patrol agents. I was surprised to see such a large operation mounted against railroad transients, who are after all so unobtrusive that most people are unaware that they exist. But the patrol agents meant business.

They wore green uniforms and heavy boots and carried revolvers and walkie-talkies. They drove in green vans, coordinating sweeps and pincer movements to flush the aliens from the brush. They searched the tracksides. At one point they leaped into an abandoned factory compound and shone their flashlights into its dark corners. It was classic anti-infiltration procedure and, as usual, it was frustrating.

At 11 P.M. the border patrol deployed at one end of the Atchison, Topeka & Santa Fe yards. Eight aliens were already locked in the vans. The Rio Grande River was a stone's throw away, and beyond that was Mexico. The locomotive shone its headlight down the track and moved slowly forward.

Action by the border patrol

For some reason, the sound of diesels coming close has always put a cold stone of fear in my stomach, but the border patrol agents didn't seem to be affected. When the units chugged by they swarmed up the gondola ladders onto the inevitable Mexicans. One patrolman, climbing in, chased them from one car over to the next. The train began to rock faster, picking up speed. Another agent pulled four from a boxcar, while a back-up team netted others rising from the brush. Altogether, 24 were captured. Several were repeats from the night before.

I left El Paso after that, on the Southern Pacific line. Five Mexican teen-agers crept on board just before it rolled out. In Tucson, at dawn, they and as many others were removed by the border patrol. I was allowed to stay on, because I am American. West of Tucson the train stopped to exchange some cars with a Phoenix-bound train, and a dozen more Mexicans emerged. There were even two in one of the rear locomotives, demanding to know what was going on.

On the way to Phoenix there was a Mexican boy, 15 years old at most, with an assortment of other tramps. Between Phoenix and Yuma the train stopped in the middle of the desert. Two men walked up, asked me in Spanish if the train was going to Los Angeles, climbed into the boxcar ahead and slammed the door shut. I was amazed. It was then 100 degrees, in midmorning.

I got off at Yuma. I wanted to find out if any orthodox tramps were there because Yuma, with its warm

weather and citrus groves, is favorite wintering territory. But all of them had gone north for the summer. The Mexicans had the field by default. I knew they were aboard every train that went through, even though they were invisible. It was as if they had inherited the position of the hoboes—people looking for work and going about it the hard way—except that these Mexicans had the illusion that the discomforts they endured were for a purpose, that they were entering the promised land. I wondered where they learned which trains to take—probably it was common knowledge in the border towns. Years from now that knowledge, and the memories of the trip, will become folklore for their descendants, as freight-riding itself is becoming for the rest of us.

In Yuma, I got into the back of a pickup truck on the top level of an automobile rack for the ride to Los Angeles. Ahead of me was another automobile rack with Oldsmobiles. The border patrol agent stopped by to chat with me, then climbed down when the train began moving. The train rumbled across the river into California and the Mexicans began popping out from under the automobiles like rabbits from a magician's hat. Dressed in jeans and dirty T-shirts, they looked like tough American teen-agers from the cities. One wore an adolescent's beard, and it was he who slipped the wire down the car window and opened the door. I got inside with them. With my pidgin Spanish I learned that they came from Sonora, from Mexico City, Guadalajara—from all over Mexico. They were going to Los Angeles where they had relatives and friends and where they thought they could get jobs. They had not eaten since the day before and the source of their next meal was uncertain.

The keys were in the ignition, but radio and power windows had ceased working so the young Mexicans got out onto the top of the swaying train and broke into the car ahead. The Oldsmobiles were comfortable with their plush upholstery and floor rugs. Mexican music drifted from the windows ahead and from the tiers beneath, mingling with the clackety-clack of the train's wheels.

Parallel to the tracks ran the interstate highway, with its speeding traffic of long, sleek automobiles. Billboards angled in to catch the drivers' attention, and no faces turned to look at the silhouetted figures high up on the train. Yet there they were. Dirty Mexican youths —as dirty as I was—riding into their future 20 feet above the desert landscape. With a great display of cool, they tapped cigarettes into the ashtrays and rested their elbows on the doors. It would be some time before they rode in such style again.

A group of Mexicans who made it across the border ride in style on a freight car loaded with new Oldsmobiles. Riders are relaxing because they've just passed Indio—halfway from Yuma to Los Angeles.

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Two beetles from Brazil (above) demonstrate the wide range of forms this successful order can take.

A *Sternotomis itzingeri* from Uganda looks like something out of *The Helstrom Chronicle*. Only

Nature's most successful design may be beetles

By Michael Emsley
Photographs by Kjell B. Sandved

Scavengers, pollinators, dung disposers: These insects have survived virtually every threat—and may survive the coleopterists

something like 60 percent of the world's beetles
have been described; many are small and secretive.

Hairs and spines mark a Bolivian specimen (top).
Function of the horn, lower beetle, is unknown.

For at least 250 million years, beetles have been evolving adaptive strategies to escape from their enemies. During the last two-and-a-half centuries, however, their environment has been invaded by an awesome predator against which their well-tried defenses afford only minimal protection. None of their earlier pursuers were equipped with vision that had such fine resolving power and perception of color and depth. Nor had beetles been so crudely exposed during their crepuscular and nocturnal activities by the generation of synthetic light. The persistence and thoroughness of that variant of *Homo sapiens* known as the coleopterist is second in monomaniacal drive only, perhaps, to that of the better-known variant that seeks out butterflies and moths.

One of the unwitting understatements of all time oc-

curs in *Peter Parley's Tales of Animals* (1839): "There are several kinds of beetles. . . ." There are as many species of described insects as there are of all other organisms, and more than one-third of known insects are beetles! Because many beetles are small, inconspicuous and secretive, the known species may account for no more than 60 percent of the total beetle fauna. It seems likely that more beetles have been preserved on pins or cards than all other insects combined.

Some years ago I visited a colleague whose specialty was rove beetles. When I saw his collection, I was overwhelmed. The massive, lifetime collection was housed in thousands of immaculately curated tiny drawers each containing from one to 16 beetles. Every beetle was perfectly spread and fixed to a rectangular card. Each drawer was the tray of an English matchbox, with a glass bead cemented to the end to act as a handle. The housings of the trays had been glued together to form cabinets which stretched from floor to ceiling. One was tempted to ask if his rate of pipe smoking was geared to the success of collecting trips.

The ardor with which some of the older entomologists pursued their goals was quite remarkable. One famous English collector used to hire assistants to act as scouts. The boys worked in pairs, one to keep the pillbox over the beetle while the other fetched their employer, who could then truthfully write "collected by . . ." on the data label. Honesty is an increasingly rare virtue.

With so many species yet to be discovered, beetle taxonomists can surely be forgiven for the zeal with which they amassed large collections of insects whose lives they little understood.

Beetles are common in nearly every habitat except the sea, and their absence from the oceans is, in part,

This desert beetle conserves water by breathing humid air trapped beneath its fused wing covers.

Colors of tortoise beetles vary according to the diet of the larva and adult; this one's from Brazil.

because the crustaceans arrived there first. The recent discovery of firefly beetles living in tide pools suggests that beetles are not allowing the crustacean domination of the sea to remain unchallenged.

The grublike larval stage has enabled beetles to exploit two, or more, entirely different types of food resource during their lifetime. Adult beetles or their

larvae can be found in soil and decomposing vegetation where they eat other animals, fungi, dung, microorganisms, wood and the roots of living plants. No aerial parts of seed plants are immune from their attack, and some leguminous trees even depend upon beetles for the successful dispersal of their seeds. Ambrosia beetles use the tunnels they chew in living wood

Bodies and wing covers of Buprestidae such as this have been used for centuries in making jewelry.

as gardens for the cultivation of the fungi upon which they feed. Beetles have been found guilty of gnawing through metallic and polyethylene cables, and one species even feeds on *Lonchocarpus* from which we derive the insecticide rotenone.

With such diverse feeding habits, it is quite extraordinary that in a world replete with cellulose, only a very few beetle larvae have evolved an enzyme capable of digesting it. Many wood-eating beetles depend upon microorganisms in their alimentary canals to accomplish the digestive process. Some beetle larvae really feed on the intestinal microorganisms, and eat wood only to keep them flourishing. Not all beetles are vegetarians, however, for many feed on other insects which they capture in traps, or by stealth and agility, while still others feed on tadpoles and small fish.

Beetles demonstrate the limits of contemporary insect size. The Goliath beetles of Africa are larger than

A biologist at George Mason University, Emsley wrote on tropical moths in SMITHSONIAN, *August 1972.*

The most transparent tortoise beetles, as here, are known as Plexiglas bugs, for obvious reasons.

a mouse, while the smallest Ptiliidae, at one-quarter of a millimeter long, are smaller than a good-sized amoeba. One wonders how the complex organs of an insect can be compressed into so small a space. Yet, in spite of such diversity, beetles are relatively uniform and amongst the easiest of insects to recognize.

It is in the fields of behavior and ecology that so much remains to be discovered. The gross habits of dung beetles have been known since the pharaohs, but only recently has it been found that while rolling their balls of dung the beetles navigate by orientation to the sun and polarized light. Not only do species of firefly have subtly different flash sequences to attract mates of their own kind, but there are predatory species whose females (chauvinists please note) mimic the signals of up to four other species and lure aroused lovers to their death.

Our interest in beetles is more than academic, however, for they are important scavengers and among the most ancient pollinators of flowering plants. In fact, our understanding of the relationship between man and beetles is growing rapidly. For example, it is now apparent that when tropical forests are cleared to make way for rural development, the resident populations of dung beetles are substantially reduced. This is an ecological change which will almost certainly lead to an increased human parasite burden, for human feces will persist on the ground as sites for reinfection for a longer time.

The use of beetles as human food is an opportunity that Western civilization seems to have let pass by. The

Yukpa Indians of the Venezuela-Colombia border regard beetles as a minor but relished source of food. Kenneth Ruddle writes: "The largest of the beetles eaten is the rhinoceros beetle. . . . In the culinary preparation of the adult form, most people remove the legs, wings, thorax and head. The abdomen, skewered on a small stick, is then thrust briefly into the fire to toast lightly. Some, mostly children it seems, prefer to eat these beetles in a raw state. The elytra and hind wings . . . are sometimes used as necklace ornaments and the femur . . . is used as a bead separator."

Although beetles do not suck mammalian blood and are rarely implicated in the transmission of human diseases, some beetles are, nevertheless, a painful nuisance. Many poisonous animals are brightly colored in various combinations of red, yellow and black, presumably so that experienced predators can easily distinguish them from palatable prey. However, the absence of warning colors is not a reliable guide. One evening in Nigeria, the pains of a bruising rugby game had just dissolved when the clubhouse was overtaken by thousands of velvety-gray beetles which had been attracted to the lights. Within minutes, feet, arms, necks and backs were breaking out in burning blisters, each an epitaph to a squashed beetle. The nocturnal ambitions of players and spectators alike were rapidly refocused on escape and relief. We learned that night that it is not for nothing that the textbooks list Meloidae as "blister beetles."

The bright colors of beetles are not always easy to explain, for many of the brilliant species are nocturnal and it is doubtful if their patterns are then visible. Perhaps their colors only look bright in the collection, and in their natural surroundings they blend into the mosaic of sunflecks that filter through the forest canopy. There can be no doubt that beetles are at least as beautiful as the photographs in this article suggest, but few people ever get close enough to see. Our most common contacts with beetles are as insect fragments in packaged food, as garden pests and as tunnelers in wood. The antiquing of modern furniture to simulate the activities of wood borers long deceased is an ironical tribute to the belief that "the only good beetle is a dead beetle"—a negative attitude which is epitomized in the English slang for shoes with very thick rubber soles: They are known as "beetle crushers."

Beetles, like some other insects, have a high tolerance to radioactivity; thus, should Man exterminate himself in a nuclear war, the ubiquitous beetles will surely inherit the Earth. Such a castastrophe would demonstrate to the ghosts of Man that it was really the beetle that was nature's most successful design.

This chrysomelid from Brazil looks more like a Christmas ornament (see pp. 40-45) than an insect.

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Leonardo the Blockhead used hypothetical rabbits
to produce a mysterious series of numbers.

By William Hoffer

A magic ratio recurs throughout art and nature

The curves of seashells and galaxies, the proportions of playing cards and the Parthenon are all based on the ratio .618034

His neighbors in Pisa called him *Bigollone,* "the Blockhead." His real name was Leonardo and he was the son of Bonaccio, a customs official whose name meant "Simpleton." Back in the 13th century, when discoverers and inventors rated slightly below sorcerers on the social scale, Leonardo the Blockhead stumbled onto one of the great mysteries of the universe.

History speaks of him as Fibonacci, which literally means "Son of the Simpleton." He grew up in the North African city of Bugia, where his father was stationed. The inquisitive youngster was educated by Muslims of the Barbary Coast, who taught him the Arabic system of numerals. He quickly realized that "98" was much simpler to work with than "XCVIII." Returning home to Pisa, the young scholar apparently let his mind wander as his feet shuffled through town, and when inspiration hit he would grab a bit of chalk from his pocket and absentmindedly scrawl numbers onto the nearest wall.

In 1202, at the age of 27, Fibonacci published *Liber Abaci (The Book of the Abacus),* the historic manuscript that was the principal means of introducing Arabic numerals to the European world. This accomplishment alone was a spectacular contribution to scientific thought, but a small section of the book contained a theoretical problem that has fascinated scholars for centuries. Fibonacci's solution to the problem resulted in a mysterious series of numbers that have led mathematical sleuths on a merry chase through the realms of art, architecture, oceanography, botany, biology, astronomy and music. Yet, to this day, no one can fully explain their significance.

The problem, as posed by Fibonacci, is this: "Someone placed a pair of rabbits in a certain place, enclosed on all sides by a wall, to find out how many pairs of rabbits will be born there in the course of one year, it being assumed that every month a pair of rabbits produces another pair, and that rabbits begin to bear young two months after their own birth."

There is no record that Fibonacci actually bred any rabbits. But his own fertile mind produced a succession of numbers that grew dramatically.

The mathematician reasoned that in the first month the original pair did not breed, but thereafter produced an additional pair each month. By the fourth month the first offspring reached maturity and began breeding also. Each month a new group of two-month old animals would breed, multiplying the rabbit population at an ever-increasing speed. At the end of 12 months the original rabbits and their offspring would number 233 pairs!

Fibonacci listed the total pairs of rabbits at the end of each month, and created the following sequence of numbers . . . 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233. Upon analyzing the figures, he realized that each number was the sum of the two proceeding numbers. In other words, 1 plus 2 equals 3; 2 plus 3 equals 5; 3 plus 5 equals 8; 5 plus 8 equals 13, and so on, ad infinitum. Though the rabbits cannot continue multiplying indefinitely (age will take its toll), the Fibonacci sequence apparently goes on forever—the last two numbers in the series always combining to produce

An approximation of the golden mean shows up in the dimensions of the great pyramids at Giza.

Illustrations by Barbara Alu

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The golden mean (continued)

yet another. The 100th number in the sequence is a whopping 354,224,848,179, 261,915,075!

The series may appear to be composed of nothing more than random numbers; in fact they are as precise as nature itself. Students of the Fibonacci sequence discovered that each number bears a special relationship to the numbers surrounding it. If you divide a Fibonacci number by the next highest number, you will discover that it is precisely .618034 times as large as the number that follows. (The precise figure appears when the Fibonacci numbers are large enough to be precise; it works for all numbers after the 14th in the sequence.)

And .618034 is a magic number.

The golden proportion of .618034 to 1 is the mathematical basis for the shape of playing cards and the Parthenon, sunflowers and snail shells, Greek vases and the great spiral galaxies of outer space.

The Greeks based much of their art and architecture upon the proportion of .618034 to 1. They called it "the golden mean." The Greeks apparently did not understand the mathematical basis for the golden mean, but they knew it pleased the eye. They defined the golden mean as the point that divided a line into two parts in such a manner that the smaller part was in proportion to the larger part as the larger part was to the entire line. They determined that point by various geometric exercises.

Johann Kepler, the astronomer and no mean mathematician himself, considered it an outstanding achievement. He said: "Geometry has two great treasures: one is the theorem of Pythagoras; the other, the division of a line into extreme and mean ratio [the golden mean]. The first we may compare to a measure of gold; the second we may name a precious jewel."

Perhaps the earliest evidence of Man's knowledge of the golden mean is still visible today on the plateau of Giza in Egypt. Some scholars say that the Egyptians based their work on a loose proportion of 5 to 8, two early numbers of the Fibonacci sequence that approximate the golden mean, but are slightly off. The average ratio of altitude to base of all the pyramids at Giza is about .625 or 5 to 8. There is scholarly disagreement as to the exactness of Egyptian knowledge, confounded by the fact that age has crum-

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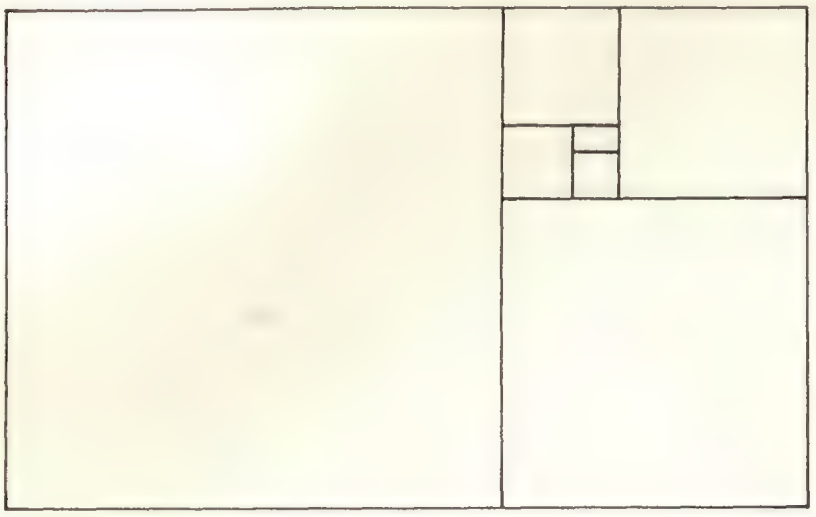
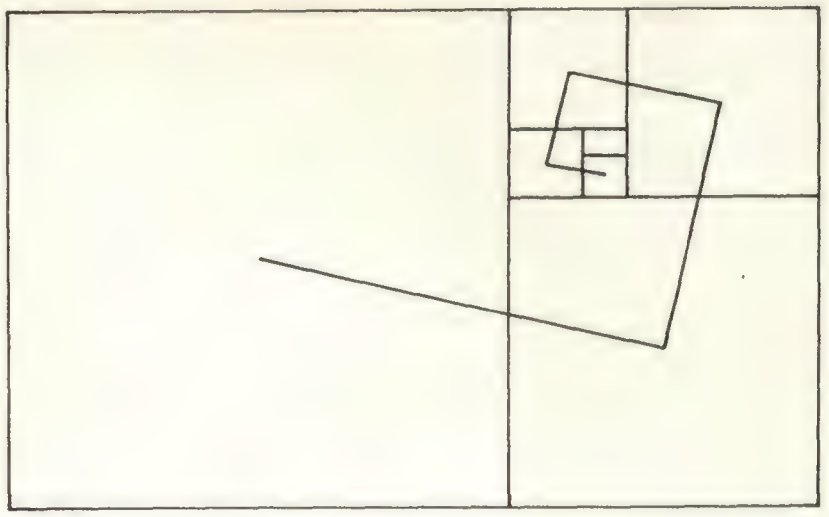
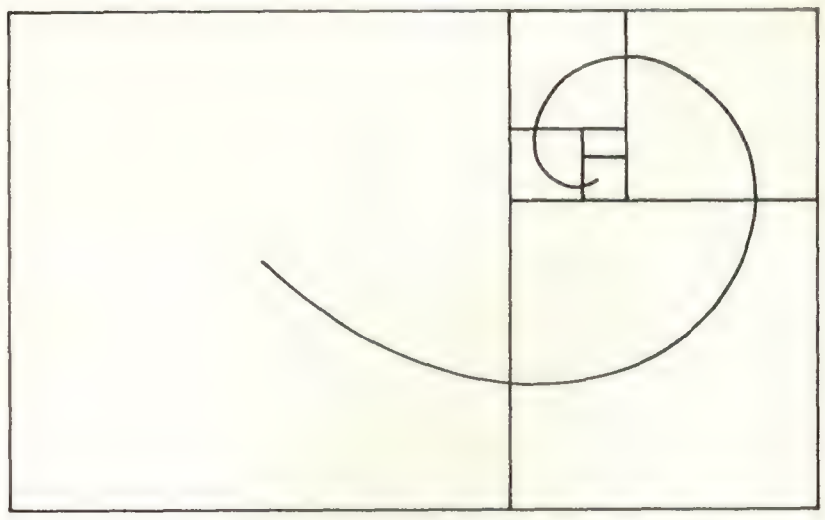




Drawing a golden spiral

Above is a golden rectangle: The depth is .618034 of the width. When the left side was squared, another smaller golden rectangle was created on the right side. Then the square at bottom right created the rectangle at top right, and so on. In the figure at upper right, the centers of the squares thus formed have been connected. When the connecting line is smoothed into a curve, right, you have the golden spiral so rampant in nature.



bled the capstones of the pyramids so that their precise original heights must be estimated. At least one serious scholar claims that the Great Pyramid was originally 484 feet 5 inches in height. Reduced to inches—there is reason to believe the Egyptians worked in inches—the height would then be 5,813 inches (5, 8 and 13 are numbers in the Fibonacci sequence). If that figure is correct, then the pyramid represents an astounding calculation. If the height of the pyramid was considered to be the radius of a circle, the circumference would be 36,524.2 inches. Did the Egyptians know that the exact length of a year is 365.242 days?

The Egyptians were obviously appreciative of the triangle. From it they developed the pentagon and its star-shaped sister the pentagram, both of which are inscribed in a circle by drawing a series of triangles. Both forms are remarkable displays of the golden mean, with intricate divisions of the figures separating lines into proportions of .618034 to 1.

The mystery deepens when the golden proportion is expanded to a four-sided figure. If you draw a rectangle so that the smaller side is .618034 as long as the larger side, you have created a unique and pleasing piece of art. Both Pythagoras and Euclid called it the rectangle of the Divine Section. In 1876 German psychologist Gustav Theodor Fechner measured the dimensions of thousands of common rectangles, such as playing cards, windows, writing pads and book covers. He found that, on the average, their proportions were close to the golden mean. Without knowing why, the designers had realized that the golden rectangle was a pleasant shape. Fechner and a successor, Wilhelm Max Wundt, tested hundreds of individuals to determine their preferences for rectangles of various proportions. About 75 percent preferred the proportions of the golden mean.

The golden mean, triangle and rectangle all formed the basis for much of the classical art and architecture of the Greeks. Plato wrote:

"It is impossible to join two things in a beautiful manner without a third being present, for a bond must exist to unite them, and this [bond] is best achieved by a proportion.

"For, if of three magnitudes the mean is to the least as the greatest to the mean, and, conversely, the least is to the mean as the mean to the greatest—then is the last the first and the mean, and the mean the first and the last. Thus are all by necessity the same, and since they are the same, they are but one."

The front of the Parthenon, including the pediment when it was intact, would have fitted almost exactly into a golden rectangle. The beautiful Greek vases are designed to please the eye with intricate and exquisite golden proportions. Greek figure sculptors chose the navel as the golden mean of the body, with the upper area again being divided into golden proportions at the neck and eyes. The Greek

A free-lancer, Hoffer is Washington regional chairman for the American Society of Journalists and Authors.

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The golden mean (continued)

sculptor Phidias was especially fond of golden ratios and his work exhibits them in such proportions as the relation of the width of the throat to the width of the head; the narrow part of the thigh to the widest part; the width of the calf to the ankle; the width of the forearm to the wrist; and so on, with beautiful attention to proportional detail.

The secret was lost with the fall of Greece, but it began to surface in the 16th century. Another Leonardo, named da Vinci, became fascinated with "geometrical recreations" and utilized them in painting and sculpture. In 1509 he collaborated with a monk named Luca Pacioli and produced a book which they entitled *De Divina Proportione.*

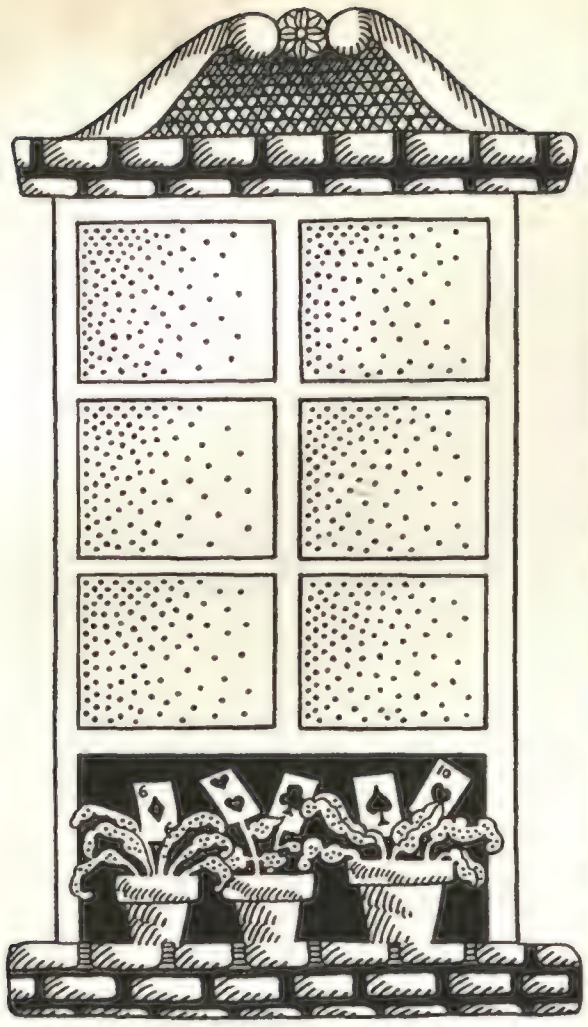
Many of the masters began to proportion their canvases according to the golden mean, from Piero della Francesca and Bellini to Poussin and, in the 19th century, Seurat (the latter was said to "attack every canvas by the golden section").

In the early 20th century, Yale scholar Jay Hambridge defined two types of geometric symmetry in classical and modern art. One he defined as static symmetry, based on the straight lines and sharp angles seen in the lifeless forms of Roman art. The more imaginative form he called dynamic symmetry, which was based on what he called "whirling squares." This is the vibrant, alive, moving style of art, Hambridge said, which was more characteristic of the Greeks. An analysis of "whirling squares" brings us a step closer to understanding the esthetic appeal of the golden mean.

It was Jakob Bernoulli in the 17th century who began to suspect that the golden mean was intimately connected with the strange twists of nature. To see the connection, we must look inside the golden rectangle.

If you draw a square into one end of a golden rectangle, you are left with another, smaller golden rectangle (see page 115). This division can be performed again and again until you are left with a succession of Hambridge's "whirling squares" which can be reduced or expanded ad infinitum. When you connect the center points of the successive squares you draw a sort of stiff spiral that works its way ever larger. Any section of the spiral is .618034 as large as the remainder of the spiral.

But golden proportions do not limit



Tests indicate people prefer rectangles that approximate the golden mean.

themselves to straight lines. When you curve out the lines, you have drawn a golden spiral. Bernoulli named it the logarithmic spiral, and he noted that any line drawn from the center of the spiral will intersect it at precisely the same angle as any other line. For this reason it is also known as the equiangular spiral. Bernoulli was so impressed with it that he ordered it engraved on his tombstone.

Much as Christopher Columbus discovered America after Leif Ericson (not to mention the Indians), much as Fibonacci discovered the proportions of the golden mean after the Greeks and the Egyptians, Bernoulli discovered the logarithmic spiral long after nature herself. "Nature uses this as one of her most indispensable measuring rods, absolutely reliable, yet never without variety, producing perfect stability of purpose without the slightest risk of monotony," wrote C. Arthur Coan. ". . . We shall find it flung broadcast throughout all nature."

Legend has it that the mollusk originated from the earthworm. One day the worm, rendered frisky by the sun, emancipated itself, brandished its tail and twisted itself into a corkscrew for the sheer fun of it. If that is the case, there were frisky worms in abundance who twisted themselves into a wide and pleas-

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ing variety of logarithmic spirals. Shellfish from among the earliest forms of life exhibit the spiral. "It is possible to trace, even back in the plankton phase, distinct expressions of spiral organization associated with Fibonacci ratios," wrote A. H. Church. The globigerinae, planorbis vortex, terebra, turritellae and trochida all build their tiny bodies according to the logarithmic spiral, as does the snail.

One of the most spectacular sea spirals is created by the chambered nautilus. As the animal grows it builds ever larger compartments in an expanding spiral formation. When each new apartment is ready for occupancy, the animal crawls

Greek figure sculptors selected the navel as the golden mean of the human body.

forward, slamming the door behind it with a layer of mother-of-pearl. The old living quarters remain filled with gas and air, so that the whole structure remains bouyant in spite of its massive build. Not only does the nautilus build the outside of its shell in a spectacular spiral, but the inner partitions are also curved in the same graceful form.

Surfers shooting the gap underneath a breaking wave are covered by a logarithmic spiral of ocean spray. The shoreline of Cape Cod is a logarithmic spiral. The spiral formation is so closely allied with the relentless pounding of the sea that the great Swedish treatise on shipbuilding, *Architectura Navalis Mercatoria,* suggests that the most effective shape for the arms of an anchor is the same spiral.

Botany is a veritable gold mine of spirals and Fibonacci numbers. Many types of composite flowers exhibit striking examples. The outcome of "She loves me,

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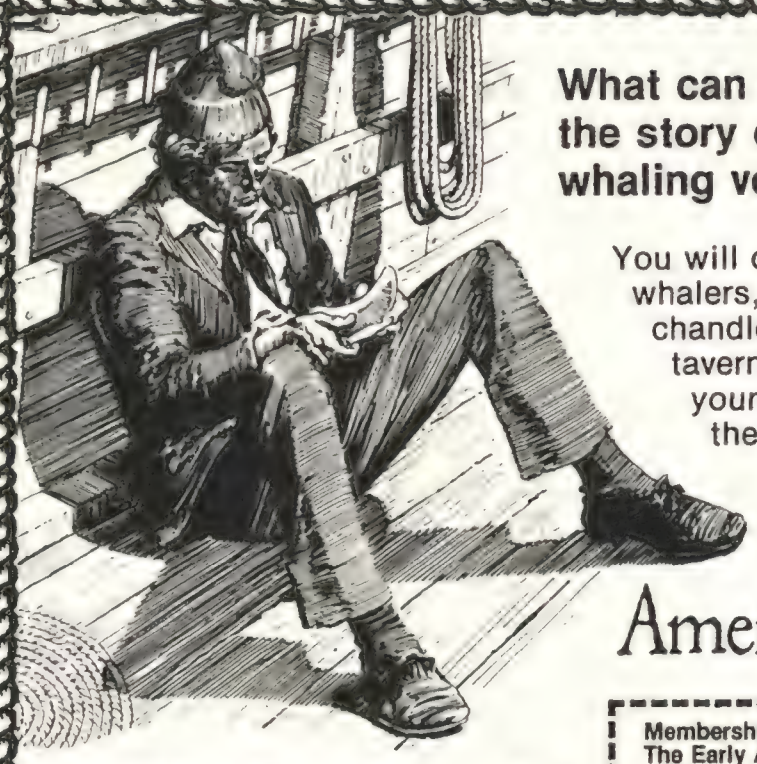

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she loves me not" is quite likely to depend upon a Fibonacci number of daisy petals. One researcher has discovered daisies with 21, 34, 55 and 89 petals. If the number of petals is not an exact Fibonacci number, it is likely to be close.

Sunflower seeds are arranged in logarithmic spirals flowing out from the center in both directions. If you count the number of seeds along the clockwise and counterclockwise spirals, you will be rewarded with successive numbers in the Fibonacci sequence. Most sunflower heads seem to have spirals of 34 and 55 seeds. Smaller ones generally have 21 and 34, while larger ones contain 55 and 89 seeds. One giant sunflower grown in the Soviet Union reportedly exhibited spirals containing 89 and 144 seeds.

The scaly plates of the pineapple exhibit three distinct logarithmic spirals. Five wind sharply up in one direction, while 13 form a more gentle logarithmic spiral. In the other direction flows a third spiral comprised of 8 plates.

Pine cones produce highly visible logarithmic spirals based on Fibonacci numbers. Pine needles tend to grow in clusters of 2, 3 or 5, depending upon the species.

None of these examples is always found to be perfect in the field. The Fibonacci sequence in nature is not a universal law. Rather, it seems to be a fascinating natural tendency that appears far too often to be discounted as mere chance.

A botanical phenomenon known as phyllotaxis produces even stranger evidence of Fibonacci numbers. Phyllotaxis refers to the arrangement of leaves upon the stalk of a plant. If you examine the stalk of almost any green plant, you can observe the Fibonacci numbers in action. Start at the bottom with a given leaf. Then move up the stalk, counting the leaves until you reach a leaf that is directly above the first one (do not count the first one). You will have a Fibonacci number. In addition, the number of times you circled the stalk (whether clockwise or counterclockwise) will be another Fibonacci number! For example, there are generally 13 buds arranged between two vertical lines on a pussy willow stem. To count the buds, you must circle the stalk five times.

Most of nature's horns, claws and teeth seem to exhibit the spiral—perhaps most spectacularly in a ram's horn or a parrot's

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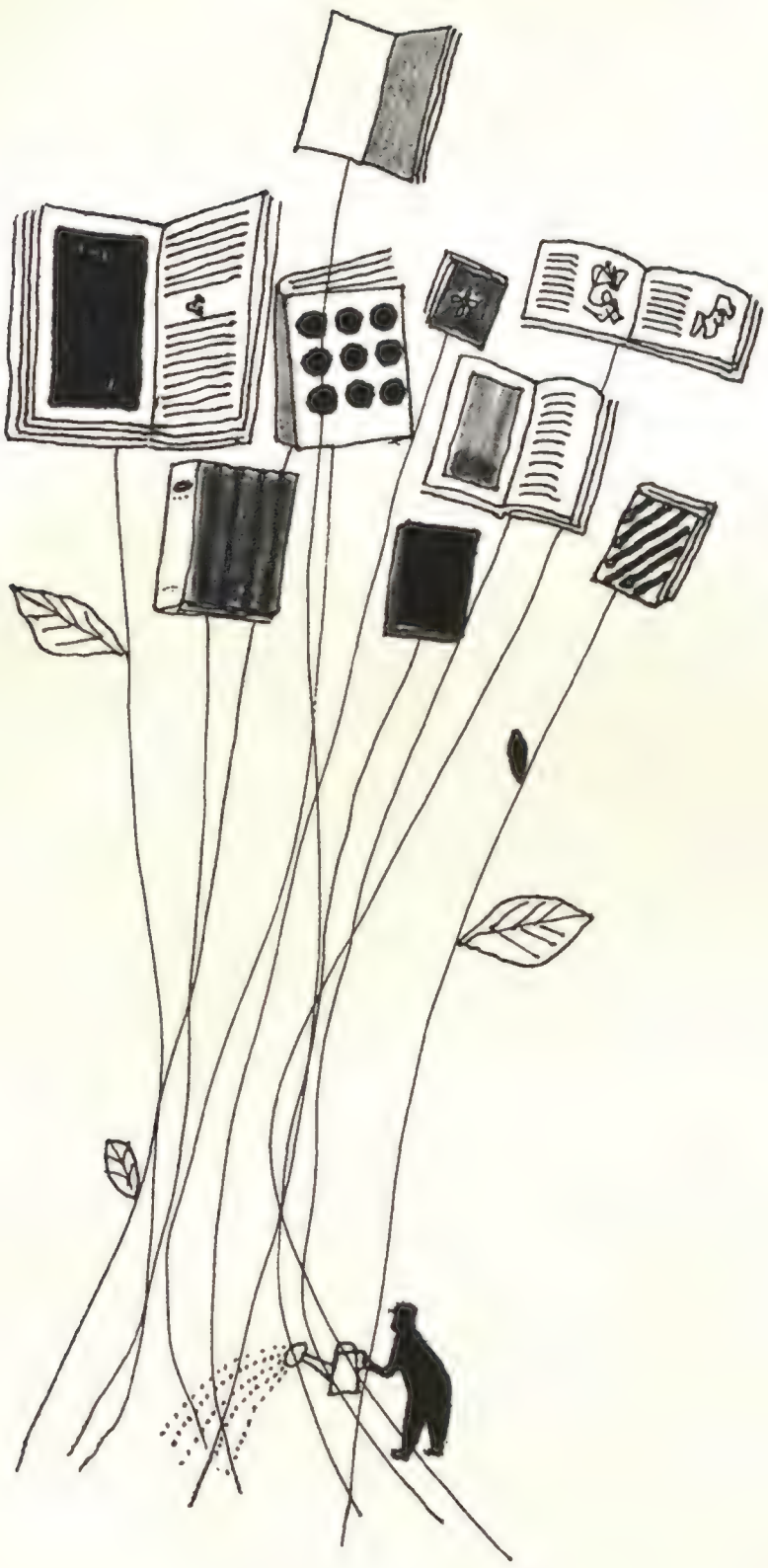

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The golden mean (continued)

beak, but no less beautifully in an elephant tusk or a lion's claw. The extinct saber-toothed tiger and mammoth prove that the spiral has been twirling mysteriously for millions of years.

Sometimes the curve is barely perceptible, but is a portion of the logarithmic spiral just the same. Any dentist knows that he must pull a tooth in the direction of its curve.

Golden spirals can be found in rows of sunflower seeds and stars in a galaxy.

(continued)

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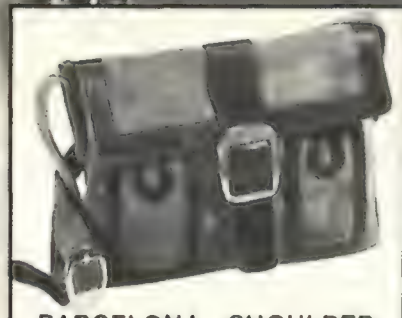

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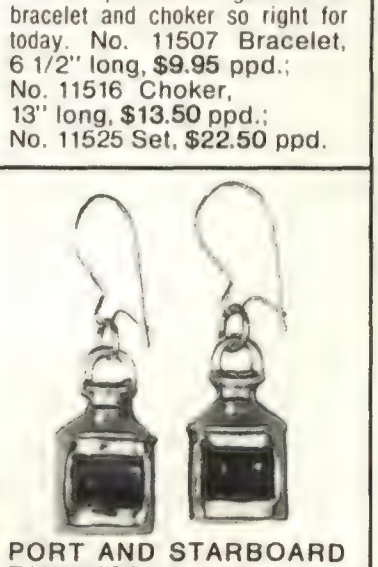

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The golden mean (continued)

Swedish astronomer Carl-Gustav Danver has studied the characteristic shape of the great galaxies of outer space. He developed techniques for photographing them and then manipulating the photographs so that the galaxies could be viewed as though on a flat plane. The predominant appearance, he reports, is that of arms of stars twirling outward in spectacular logarithmic spirals.

The continual occurrence of Fibonacci numbers and the golden spiral in nature explains precisely why the proportion of .618034 to 1 is so pleasing in art. Hambridge had said that Greek art was based on dynamic symmetry—"whirling squares" that seemed to vibrate with intense energy. Greek art seemed to be alive, because it was based on one of the most common proportions of life itself. This is why a golden rectangle is a pleasant shape. Man can see the image of life in art that is based on the golden mean.

Fibonacci's abracadabric rabbits pop up in the most unexpected places. The numbers are unquestionably part of a mystical natural harmony that feels good, looks good and even sounds good. Music, for example, is based on the 8-note octave. On the piano this is represented by 8 white keys, 5 black ones—13 in all. It is no accident that the musical chord that seems to give the ear its greatest satisfaction is the major sixth. The note E vibrates at a ratio of .62500 to the note C. A mere .006966 away from the exact golden mean, the proportions of the major sixth set off good vibrations in the cochlea of the inner ear—an organ that just happens to be shaped in a logarithmic spiral.

Occurrences of the Fibonacci sequence —like the sequence itself—never seem to end. Science can document their existence, but cannot fully explain them.

Why, for example, does the epeira spider always spin its web into a logarithmic spiral?

And why does a meteorite, when it ruptures the surface of the Earth, cause a depression that corresponds to a segment of the logarithmic spiral?

Why do bacteria grow at an increasing rate that may be plotted along a logarithmic spiral?

And why does the tail of a comet curve gracefully away from the sun in a gigantic, blazing, logarithmic spiral?

Applications of the Fibonacci sequence in science and art are so seemingly endless that an entire cult of mathematicians has been organized for further study of the phenomenon. Known as the Fibonacci Association, the group has published its own scholarly journal, *The Fibonacci Quarterly,* since 1963.

The coeditor of *The Fibonacci Quarterly* and a founder of the association is Verner E. Hoggatt jr., a professor of mathematics at San Jose State College. His book, *Fibonacci and Lucas Numbers,* is a good source for anyone who wants to study the subject further.

The scientific explanations have varied all the way from Sir James Jeans' "God is a mathematician" to Scrooge's "Bah, Humbug!" Unquestionably, though, the Fibonacci sequence and the golden spiral are part of some recurring growth pattern.

The spiral tends to appear most frequently in nonliving matter, or in the nonliving tissues of living organisms, such as shells, horns and teeth. Britain's respected naturalist Sir D'Arcy W. Thompson pointed out that "The shell, like the creature within it, grows in size *but does not change its shape;* and the existence of this constant relativity of growth, or constant similarity of form, is of the essence." In other words, the very shape of the logarithmic spiral enables *growth* to occur without any change in form. Fibonacci's theoretical rabbits increased in number but remained as rabbits. The chambered nautilus grows larger but continues to be no more nor less a chambered nautilus.

The great golden spiral seems to be nature's way of building quantity without sacrificing quality.

Horns, fangs and claws follow golden spirals, as do the shells of snails.

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Book reviews

Gulls: A Social History
Frank Graham jr.
(Random House, $8.95)
To Save a Bird in Peril
David R. Zimmerman
(Coward, McCann & Geoghegan, $9.95)

Graham entitles his book "a social history" because he is concerned with the relations between that wonderfully adaptable bird, the gull, and an extremely destructive human society. In dealing with bird-man interactions, Zimmerman is specifically interested in fragile species and the scientists dedicated to saving them. Both books are by bird lovers, for bird lovers.

"It is hard for us to believe today that naturalists once feared for the survival of many species of gulls along the coasts of North America," Graham writes. "When someone speaks of endangered species we tend to think of whooping cranes or bald eagles. . . . Gulls flourish along our coasts and even inland in numbers that must satisfy their most ardent admirers."

Gulls: A Social History is full of gee whiz! information: Two species of gulls, presumably with common ancestors, are no longer able to communicate with one another as their voices differ. Although they occasionally interbreed, they generally do not. In regions where their breeding ranges overlap, there is a difference of two weeks or more in the start of their egg-laying periods.

Man's attitude toward gulls might be live-and-let-live were it not for collisions between birds and airplanes. Other birds —often starlings, vultures and, at least once, whistling swans and a loon—probably have been implicated in more fatal crashes than gulls. Yet, because of their numbers and social habits, gulls are the most obvious flying hazard around many an airport. Efforts are being made to remove garbage dumps and other bird attractants from the proximity of airports.

Frank Graham jr. is a field editor of *Audubon* and author of, among other books, *Since Silent Spring*. Christopher Ayres contributes 44 impressive black-and-white photographs.

While gulls run no apparent risk of extermination, 94 species of birds are known to have become extinct since 1600. Authorities estimate that only 24 percent disappeared owing to "natural" causes. The other 76 percent succumbed to "human" activity. The various world "Red Lists" now have 190 species or subspecies of birds designated as endangered.

Herring gulls: a hardy, adaptable breed

David R. Zimmerman's *To Save a Bird in Peril* is not concerned with standard conservation practices such as legal protection and habitat preservation. Rather, it is focused on about a dozen techniques of intervention in the life cycle of the bird or its immediate environment. All told, these techniques have been applied to perhaps three dozen species. S. Dillon Ripley, Secretary of the Smithsonian Institution and president of the International Council for Bird Preservation, in the foreword lauds these "first, frail, yet promising efforts that, it is hoped, will transform our skills, interest, and meager knowledge about endangered birds into affirmative conservation activity."

At the heart of this book are accounts in graphic detail of efforts to save eight birds (other examples are mentioned briefly). First, a 21-year-old student de-

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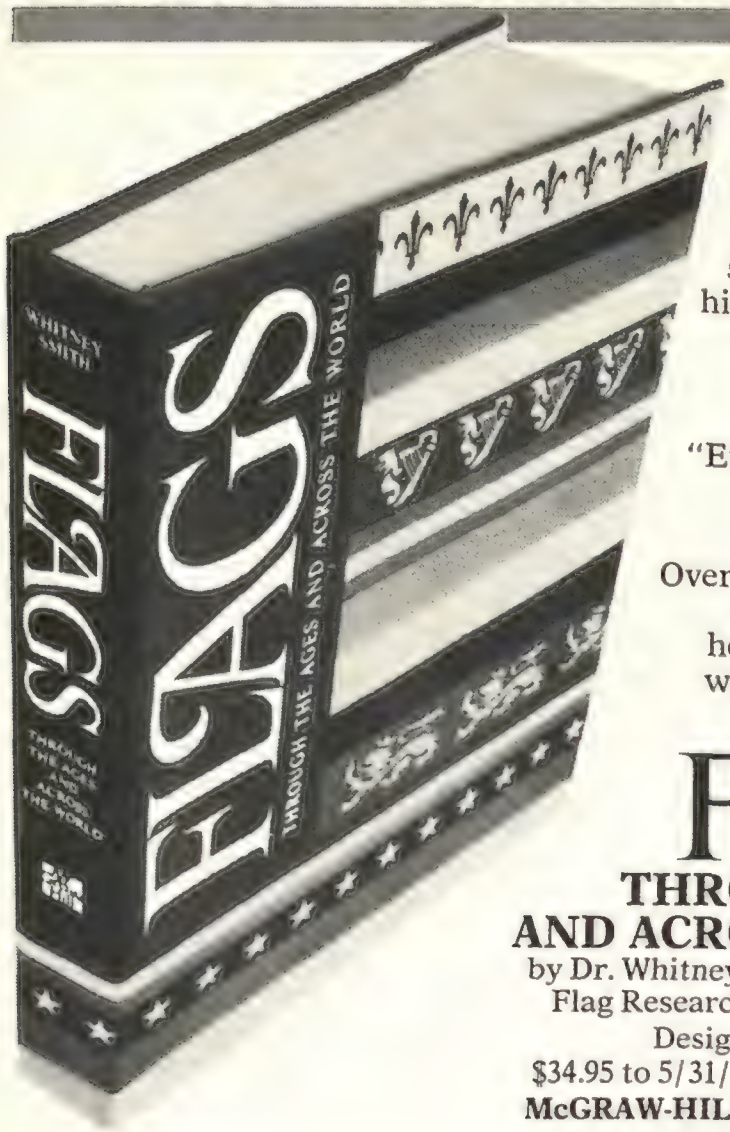

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vised the scheme for repopulating Long Island Sound with ospreys, imperiled by pesticides and by reproductive failure. Osprey eggs and chicks are removed from Chesapeake Bay in Maryland and transplanted a couple of hundred miles north, to nests on the Sound. The experiments, under way since 1968, have proved the theory that adults, after wintering around the Caribbean and in South America, return to breed in the place where they were fledged. "Home" is now Long Island Sound.

Another chapter relates the saga of Kirtland's warbler. A tiny bird (the average breeding adult weighs less than half an ounce), it is best known for the male's beautiful song, which might be sung 2,000 times a day. The threat is from the cowbird, a parasite which lays its far larger eggs in the Kirtland's warbler's nest. Trapping and asphyxiating the cowbirds is the promising solution.

Other birds included in *To Save a Bird in Peril* are: the cahows of Bermuda, the nene geese of Hawaii, the whooping cranes and peregrine falcons of North America, the vultures of Spain and the eagles of Czechoslovakia.

—*Odom Fanning*
Book review editor, *Newsletter* of the National Association of Science Writers

World Capitals: Toward Guided Urbanization
Edited by H. Wentworth Eldredge
(Anchor Press/Doubleday, $19.95)

"The capital bears high the symbolic torch for the entire nation," writes H. Wentworth Eldredge in this massive volume. Might is made visible, governments function and, incidentally (it sometimes seems), people *live* in capitals. The capital is an image-center for democracy as it is a showplace for dictatorship; it is broke, boomtown, New Town or tradition-bound —often a mix of all four.

If capitals are power centers, they are also clichés of the city in the 1970s: Are they fonts of culture or pits of disaster? Glamor exudes from Paris or London; yet the capital is also urbanites living on a subsistence level and a "laundry list" of urban ills, as editor Eldredge notes in two pages itemizing city predicaments. A professor of urban planning, Eldredge previously edited a widely used anthology entitled *Taming Megalopolis.*

His latest book, *World Capitals: Toward Guided Urbanization,* provides much of the factual base upon which to examine 11 national or provincial capitals: Stockholm, Paris, London, Dakar, Caracas, Tokyo, Washington, Brasília, Toronto, Chandigarh, Moscow. An expert on each considers its evolution and condition—both sides of the cliché. There is Stockholm, a new/old disciplined city on the water; Brasília, a dazzling jungle-city cut from the bush—and the negative of the image; there is Moscow's housing, a barometer of the bleak products of government control; and Tokyo's mass transit nightmare.

Overall, we see cities in a race with time. Whether the "guided urbanization" of the title means a design penned to the smallest line (Moscow) or mere chaos "struggling for coherence" (Tokyo, Caracas), whether they are old or new, developed or developing, a like profile emerges: It is a view of empty coffers, urbanizing populations and towns troubled by poor transit ("crossed up by auto love" is Eldredge's apt phrase) and poor human services ("The planners were so busy creating new streets and buildings that they forgot about the people"—these words of a disgruntled foreign resident in Moscow are paralleled in almost every chapter). With too little housing for the urban poor and the disheartening opinion that "the physical housing remedies remedied little" anyhow, this book's 12 authors and dense 642 pages tell a gloomy-enough tale.

They tell it somewhat more dryly than they might, however. For good and ill, most of the authors are professional urbanists; they are teachers and planners given more to speaking of "administrative units" and codes and agencies than to describing the look and feel of a place and its people. Somehow, the dispensing of solid information seems to preclude point of view or grace of prose.

Nonspecialists will find texts on some capitals brisker than others: Brasília and Chandigarh are sensitively narrated by Norma Evenson, professor of architectural history at the University of California, Berkeley. Washington is well summed up by Carl Feiss, urban design consultant, and Donald F. Bozarth of the National Capital Planning Commission. Naturally enough, London belongs to John W. Shepherd of the London School of Economics. Shepherd, like so many of his

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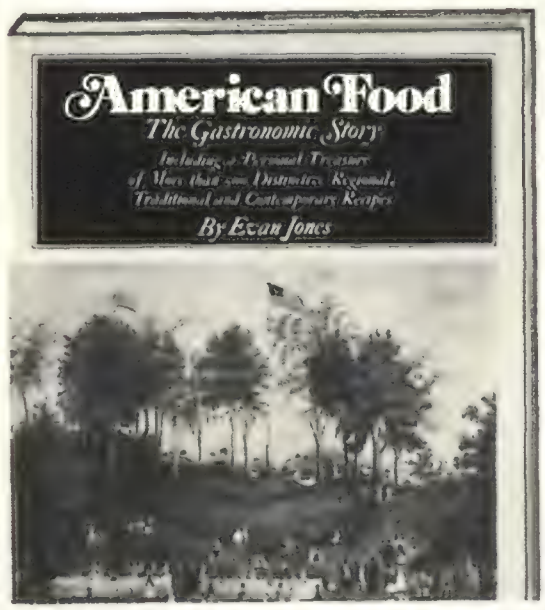

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fellow citizens, seems born with a feeling for ambience and quality-of-life in his bones. The cross-cultural background of Francis Violich, University of California professor and consultant to such cities as Caracas and Bogotá, enables him to break down the mass of statistics and help relate Latin America to North America.

"City-forming processes are a series of intricate sets of interactions between men, and between man and his physical environment," writes John W. Sommer, a specialist in African urbanization, in his chapter on Dakar. Specialists will find quantities of that sort of information on the institutional interaction; those with a political/physical bent will be more likely to dip, city by city; the casual reader will get more from asides (the Japanese proverb "Half a mat for standing, one mat for sleeping" reflects the dense living-style) than from poring through a stockpile of alphabet agencies at work.

The prodigious task of collecting these commentaries makes for a time lag. Eldredge's deft summary of the literature still reflects the social turbulence of the late 1960s, for instance, without probing deeply into today's energy concerns. The dating, plus a certain fuzziness in evaluating such "Big Pictures," may explain other discrepancies (each chapter, for example, might well merit a separate critique on content). But discrepancies are inevitable in undertaking a book laden with maps, charts and photographs, and bound for class and library use.

Nonetheless, Eldredge's prodigious reference work deserves diffusion. If this is the era of Wilfred Owen's "gray revolution"—with more than half the world to be city-bound by A.D. 2000—and if "judging the failure or success of a city is rather like judging the failure or success of the human race," we need many more such measures of this race toward the 21st century. For, as this three-and-one-half pound guide warns, "if the capital can't make it, what city can?"

—Jane Holtz Kay
Architecture critic for *The Nation*

Butterflies: Their World, Their Life Cycle, Their Behavior
Thomas C. Emmel
(Alfred A. Knopf, $29.95 until Dec. 31; $35 thereafter)

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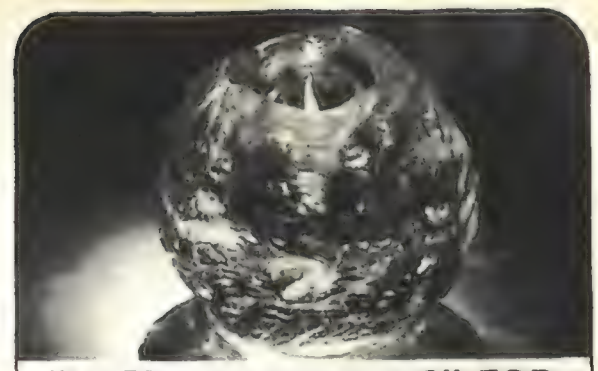

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In the swelling parade of big lepidopteran picture books, *Butterflies* surpasses the rest with its sumptuous spread of stunning color photographs: Three hundred and seventeen of them capture eggs, larvae, pupae and adult butterflies, in native habitats around the world, doing many of their various things—hatching, molting, sunning, flying, congregating, mating, resting, ovipositing and feeding (on objects as outwardly disparate as flowers and dung). Although dead specimens figure, perforce, in 18 photomicrographs of wing-scale color pattern and form, live adults ornament 81 percent of the photographs. Reproduction of these choice pictures is correctly colorful and sharp, even in 14 two-page blowups.

By contrast, the text is irritating and depressing. Much of it suggests a rapid attempt to fill a prescribed amount of space with words, with little regard for accuracy and information. The great pity is that the author is a professional lepidopterist who should know better. His text is full of factual errors, inconsistencies and contradictions, and it is often superficial and misleading.

The text was presumably reviewed by the consulting editor, Edward S. Ross (who is not—as the dust jacket claims—a world authority on butterflies). Two other people assembled photographs, another prepared a number of drawings (which bear a few erroneous labels), and two more designed and coordinated the book. Did anybody ever settle down and read the entire book once from start to finish? Too many cooks!

The galling text is divided into three parts. The first deals with life history, behavior and families of butterflies; the second, with butterflies of diverse environments: rain forest, desert, temperate forest and grassland, mountains and tundra and oceanic islands; the third, with Man and butterflies and ways of collecting and photographing the latter. Part two is especially weak. There is a terminal chart at the back of the book giving characteristics of butterfly families, followed by a glossary, a bibliography and an index, which are helpful.

Here is a small sample of glaring errors: "One example of mimicry familiar to Americans is the monarch, a danaid model whose caterpillars feed on poisonous milkweeds and thus become poisonous themselves, and the viceroy, a harmless nymphalid whose caterpillars feed on

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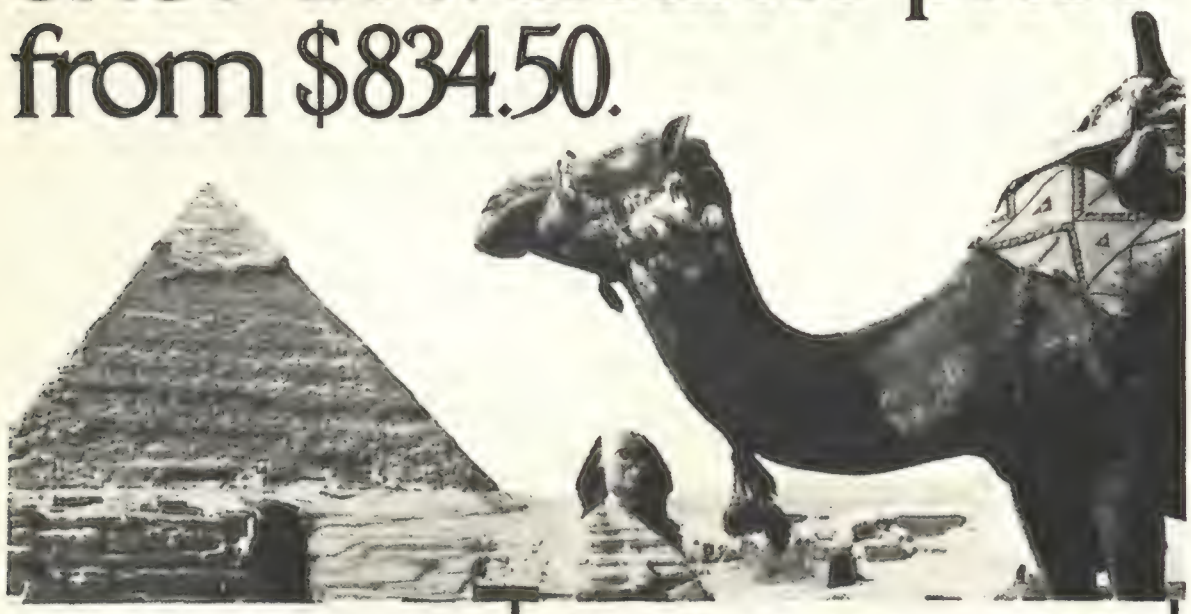

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nonpoisonous willows but resemble monarch larvae." (The mimetic resemblance is actually between adults.) The pipevine swallowtail, a distinctive and familiar North American model, is variously called *Battus philenor* (the correct name), *Papilio philenor* (an outdated name), and *Papilio troilus* (a very different species) in captions and text. The Hesperioidea—the superfamily comprising skipper butterflies—consistently appears as "Hesperoidea," once in a major boldface heading. The head of a larva does not have "a pair of simple eyes" but, instead, multiple pairs of such eyes; these appear in a handsome blowup, with a caption pointing them out (while mistakenly referring to antennae as palpi and drawing attention to jaws which cannot really be seen). The cabbage butterfly, *Pieris rapae,* "was accidentally introduced into North America in 1887 . . ."; substitute "about 1860"—by 1887 this species had spread more than halfway across the continent from its foothold in the city of Quebec.

Butterflies might enliven a coffee table but not the mind.

—*John M. Burns*
Lepidopterist and evolutionary biologist, National Museum of Natural History; author of *BioGraffiti: A Natural Selection*

Hills of Home: The Rural Ozarks of Arkansas
Photographs by Roger Minick, text by Bob Minick, drawings & etchings by Leonard Sussman.
(Scrimshaw Press, $22.50)

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A strong family, self-reliant and energetic and, like their neighbors, apparently a bit remote.

The written sections in this elegantly produced book are intriguing but exasperating, for they are "composites of recollections" sometimes mixed with stories invented by the writer. There is a fascinating diary by the teen-aged bride of an 1825 pioneer; it appears to be authentic, but one would love to know for sure.

Another episode, "Ozark Bride," narrated by Bob Minick's mother 70 years later, is billed as a composite quite specifically. Yet it sings:

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Hills of Home is a book to come back to, as quietly moving in its unsentimental realness as the people in it.

–Michael Kernan
Feature writer, *The Washington Post*

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Additional reading

Christmas ornaments (p. 40)

Glass, Its Makers and Its Public by Ada Polak, Weidenfeld & Nicolson (London), 1975

The Story of Glass by Freda Diamond, Harcourt, Brace and Company, 1953

Ecological housing (p. 46)

Energy for Survival by Wilson Clark, Anchor Press/Doubleday, 1974

Solar Heated Buildings by W. A. Shurcliff, 19 Appleton Street, Cambridge, Massachusetts, March 1975

The City People's Book of Raising Food by Helga and William Olkowski, Rodale Press Inc., 1975

Direct Use of the Sun's Energy by Farrington Daniels, Yale University Press, 1964

A Landscape for Humans by Peter van Dresser, Biotechnic Press, 1972

"Buildings as Organisms" by Day Chahroudi and Sean Wellesley-Miller, *Architectural Digest*, March 1975

Political cartoons (p. 56)

The Ungentlemanly Art by Stephen Hess and Milton Kaplan, Macmillan Publishing Company, Inc., 1968

A Century of Political Cartoons by Allan Nevins and Frank Weitenkampf, Octagon Books, 1975

Charles Carroll of Carrollton (p. 64)

The Life of Charles Carroll of Carrollton, 2 vols., by Kate Mason Rowland, G. P. Putnam's Sons, The Knickerbocker Press, 1897

"Anywhere So Long as There Be Freedom," organized by Ann C. Van Devanter, The Baltimore Museum of

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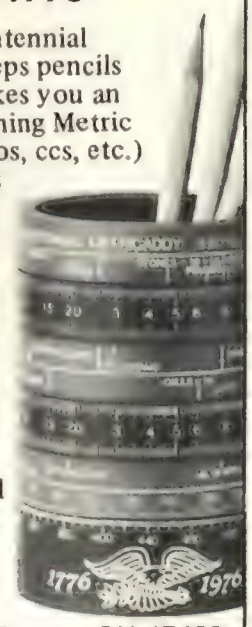

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Art, 1975 (catalog of the exhibition)
Unpublished Letters of Charles Carroll of Carrollton and of his Father, Charles Carroll of Doughoregan, edited by Thomas Meagher Field, The United States Catholic Historical Society, 1902
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Michelangelo (p. 74)
The Life of Michelangelo Buonarroti by John Addington Symonds, Modern Library, 1928 (still the fullest account of his life, although esthetic judgments reflect late 19th-century taste)
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Tramps (p. 94)
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A Manual of Common Beetles of Eastern North America, 2 vols., by Law-

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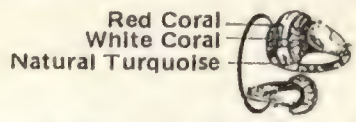

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Smithsonian highlights

Freer Gallery of Art
"Arts of Asia" is a Bicentennial exhibition presenting Near and Far Eastern art from the period of the American Revolution. The variety of materials reflects a time when China was dominated by the reigns of three major emperors, Japan was ruled by the Tokugawa shogunate, and the Near East was under the nominal control of the Ottoman sultans. The art works from these cultures form an important contrast to expressions in the New World and offer American visitors today an opportunity to consider a history and background quite different from their own—opens December 15.

Museum of Natural History
"Our Changing Land" is a new, permanent exhibit hall on the ground floor of the museum. The extensive exhibit shows how environmental change during the past 10,000 years has been reflected in a small area on the banks of the Potomac River. Full-sized habitat settings demonstrate how the processes of change have worked from the time before Man evolved on Earth to the present. The settings of animals, trees, buildings, background murals and figurines are complemented by films and slides.

National Portrait Gallery
A black basalt bust of George Washington is on view in the second-floor rotunda gallery through the end of December. The two-and-one-half-foot bust is a Bicentennial gift to the nation from Josiah Wedgwood & Sons, Inc.

A major Bicentennial exhibition based on Daniel J. Boorstin's Pulitzer Prize-

winning book *The Americans: The Democratic Experience* presents the forward-thinking men and women who, through their inventions and innovations, revolutionized America in the decades following the Civil War. Their portraits, together with patent models, catalogs, diaries, ledgers, maps, newspapers, games and instruments, visualize the "persistent democratizing of American life."

Book Discount for Associates
The McGraw-Hill Book Store in the Museum of History and Technology is now offering a discount of 20 percent on purchases of Smithsonian Press books and 10 percent on books by other publishers.

National Collection of Fine Arts
"Bob Thompson (1936-66)" is a collection of this black artist's fiery, metaphysical and imaginative paintings—opens December 19.

"Peggy Bacon: Personalities and Places" is a comprehensive exhibition of 131 paintings, pastels and prints. Peggy Bacon, who is now 80 years old, is widely known for her caricatures of people in the arts and the political world in the Thirties and Forties. Included in the show are her celebrated portrayals of Dorothy Parker, FDR, Gertrude Stein, Georgia O'Keeffe, Jascha Heifetz, Lillian Gish, Salvador Dali and others. Her works present a witty and revealing picture of society in that era—opens December 5.

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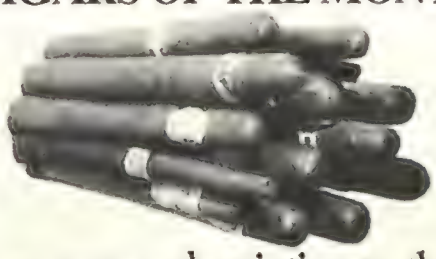

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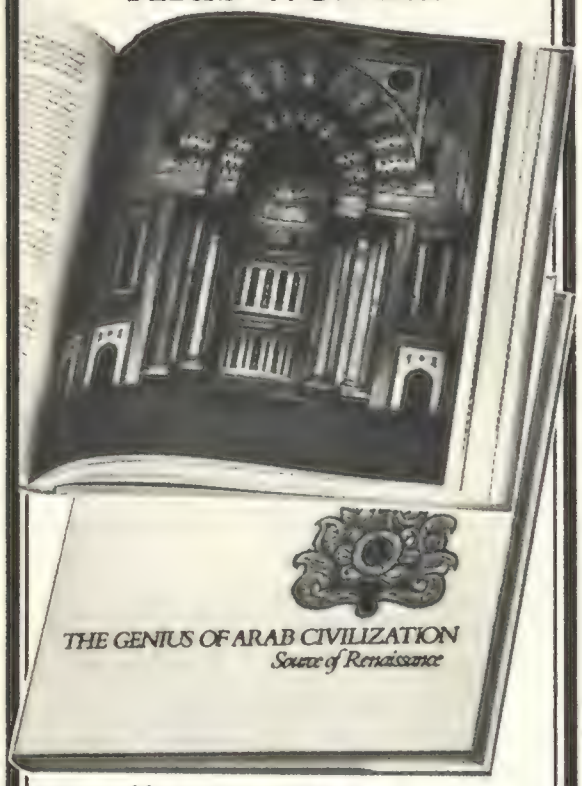

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- "Music and Dance from the Age of Jefferson," at the Palace of Fine Arts Theatre. Secretary Ripley welcomes Associates at a reception at the Exploratorium after the performance.
- "The Crown Jewels of the United States" from the Smithsonian's collection introduced by a lecture from Paul Desautels, Curator of the Smithsonian's Department of Mineral Sciences. The exhibition is on view at the California Academy of Sciences.
- "Sculptors and their Drawings," an exhibition assembled by the Hirshhorn Museum is shown at the San Francisco Museum of Art.
- "Art and the Written Word," an Archives of American Art exhibition introduced by a lecture by Dr. Paul Karlstrom, West Coast area director of the Archives, is on view at the M.H. deYoung Memorial Museum.

National Associates in the San Francisco area will receive invitations indicating specific dates and times of all events. We hope to bring the Regional Program to your area in the future. For information write: National Associates Program, A & I 1201, Smithsonian Institution, Washington, D.C. 20560.

Anacostia Neighborhood Museum

A concert of Christmas music at 9:30 A.M. announces the arrival of the museum's black Santa Claus. Santa arrives by helicopter at 10 A.M. at Martin Luther King jr. Avenue and W Street S.E.

The Anacostia Museum is compiling a booklet on "Survival Arts" of the past. The museum would like to share with its visitors how people prepared and preserved food, made soaps and other household products, what home remedies were used and how they planted, farmed and dressed around the turn of the 20th century. If you remember or have learned unique stories about "survival arts" in your family, write: Zora Martin Felton, Anacostia Neighborhood Museum, 2405 Martin Luther King jr. Avenue S.E., Washington, D.C. 20020.

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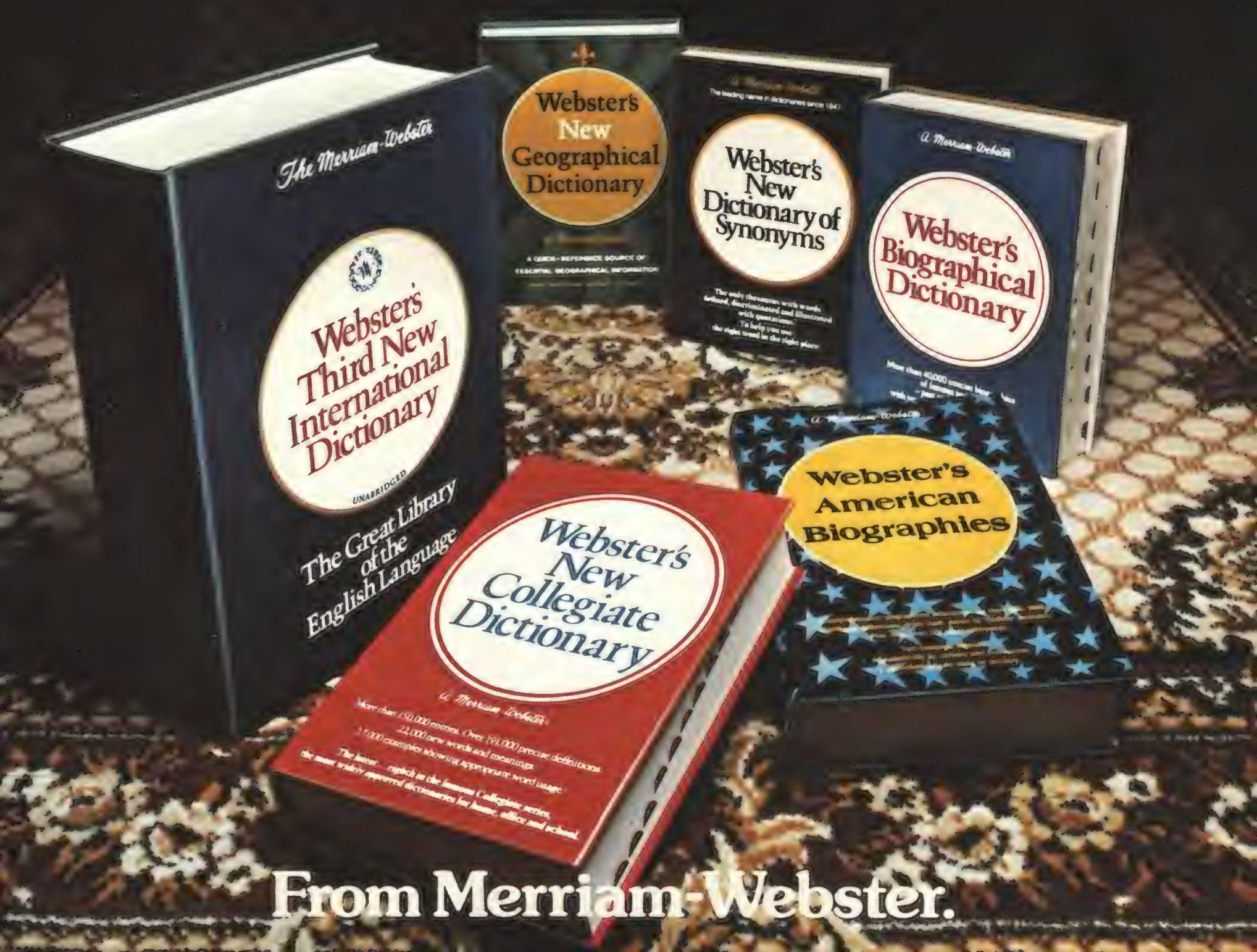

From Merriam-Webster.

Travel Benefits for Smithsonian Associates

With the growth of the Smithsonian Associates, the Institution is striving to meet the needs of its membership by offering a varied travel program. Traditionally, Foreign Study Tours provided culturally oriented, first-class, specialized trips under the guidance of museum curators or experts in respective fields. Then, Domestic Study Tours were added to offer similar opportunities within the United States, thus allowing Associates and their families a chance to combine vacation with a period of study. A year ago, Foreign Charter Tours were introduced; these trips are larger, lower-cost and more generalized in nature. Associates travel benefits are announced exclusively in SMITHSONIAN. Write addresses below for additional information.

Domestic Study Tours

Christmas at the Smithsonian—December 12-14: Fourth annual Christmas weekend includes an old-fashioned tree-trimming party in the Castle; special tours feature the Bicentennial exhibits • **A Weekend at the National Collection of Fine Arts**—January 23-25: A comprehensive look at American painting, sculpture and graphic arts in the United States from earliest times to the present • **Baja Whale Watch**—February 13-20: Gray whales, sea lions and birds from San Diego to San Benito Island, San Ignacio Lagoon, Cedros and San Martin Islands on a chartered sport-fishing boat • **Yellowstone in the Snow**—February 27-March 5: A survey of the wildlife and geography by snowmobile coach; accommodations at Old Faithful Snow Lodge • **Weekend at the Hirshhorn**—March 5-7: A comprehensive study of contemporary painting and sculpture • **Savannah and Charleston**—March 14-21: The history, culture and architecture of these two lovely Southern cities • **Death Valley**—April 3-11: A camping experience as you explore the area and surrounding mountain ranges and study the geology and mining history of the Valley • **Washington "Anytime" Weekend**—Choose any weekend to visit the nation's capital and enjoy a special tour of the original Smithsonian building, two nights at the elegant Loew's L'Enfant Plaza Hotel, close by, and a chance to see other sights in Washington by Tourmobile; all-inclusive price is $59.95 per person based on double occupancy (reservations required ten days prior to weekend) • Write Smithsonian Associates Travel Program, A & I 1270B, Smithsonian Institution, Washington, D.C. 20560 for reservations or call (202) 381-5910 for information.

Foreign Study Tours

South India and Sri Lanka (Ceylon)—January 12-February 3: Caves, natural history and palaces • **South American Discoveries Voyage**—February 5-29: A cruise on the *Apollo*, with an emphasis on natural history. Beginning at Valparaiso, sail through spectacular fjords of the Chilean archipelago, following routes of Magellan, Drake and Darwin around Tierra del Fuego and Cape Horn, calling on shores of Patagonia, northern Argentina, Uruguay and Brazil, ending up in Rio at Carnival time • **Sites of Ancient Civilization**—April 2-25: The third cruise aboard the yacht *Argonaut* is between ports of Rome and Athens in the eastern Mediterranean. Under the leadership of distinguished scholars, the voyage is now expanded to include the ceremonies in Greece during Holy Week and an extended stay in Egypt • **Sicily and Southern Italy**—June 6-28: Archaeological sites and museums from Naples south, including complete circuit of Sicily, under personal direction of Dr. Richard Howland of the Smithsonian, architectural historian and classical archaeologist • Write Miss Bliss Schumann, Foreign Study Tours, SI 123, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5520.

Foreign Charter Tours

Mexico City and Yucatan—March 6-17: A study program in Mexico City concentrating on Aztec and Toltec cultures, followed by visits to the Mayan ruins of Chichén-Itzá, Uxmal and Palenque • **Australia**—April 10-May 2: "Lifeseeing" seminars in Sydney, Melbourne and Canberra, and excursions into the countryside; choice of side trip to Great Barrier Reef and Alice Springs, or Alice Springs overland to Adelaide, or trip through Tasmania and Southern Australia • **Eastern Europe**—May 6-20: Sightseeing and "lifeseeing" seminars during six days in Budapest; a hydrofoil trip up the Danube, visiting Renaissance and Baroque towns, followed by five days in Prague • **Soviet Central Asia**—May 9-24: See the battlegrounds of Alexander the Great and Genghis Khan; Islamic culture and architecture; visits to the cities of Samarkand, Bukhara, Tashkent and Khiva • **Russia**—May 20-June 3: The Bolshoi, Moscow Circus, Hermitage, schools, factories and housing in Moscow, Leningrad and Tallinn • **Great Britain**—September 16-30: The National Gallery, Tate, Victoria and Albert; walking tours of literary London and excursions in the countryside; the best of London theater • Low cost of tours includes first-class hotels, most meals, sightseeing, lectures, theater tickets and round-trip air fare from Washington, D.C. (Australia tour originates in San Francisco; Mexico and Yucatán trip originates in Mexico City). Foreign Charter tours are heavily subscribed, so write early for reservations and additional details concerning a specific trip to Smithsonian Associates Travel Program, A & I 1270B, Smithsonian Institution, Washington, D.C. 20560 or call (202) 381-5910 for information.

Divisions of Performing Arts and Musical Instruments

- The Jazz Heritage Series presents a concert of three outstanding pianists: John Lewis, Teddy Wilson and Hank Jones—December 7, 4:30 P.M. workshop, 8 P.M. concert, Baird Auditorium, Museum of Natural History.
- The Seldom Scene, one of the finest bluegrass bands in the country, performs in the American Popular Song series—December 14, 8 P.M., Baird Auditorium.
- The Theater Chamber Players perform works by Bach, Boccherini, Carissimi, Berio and Stradella—December 29, 8:30 P.M., Baird Auditorium.

For information about discounts for Resident Associates, students and senior citizens, call (202) 381-5395.

Traveling Exhibition Service

The Smithsonian Institution Traveling Exhibition Service circulates shows of art, history and science to cultural institutions throughout the United States. "American Presidential China" is a major new exhibition, opening at the Smithsonian's Museum of History and Technology, and then beginning a national tour. It consists of a selective survey of tableware used by 38 Presidents at home and during their terms in the White House. There are 115 objects in the show and the six living First Ladies have sent samples from their personal collections. The schedule is:

- Washington, D.C.—December 6-January 11, History and Technology Museum.
- Detroit, Michigan—January 24-March 7, Detroit Historical Museum.
- Elmira, New York—March 20-May 2, Arnot Art Museum.
- Austin, Texas—May 22-July 4, Lyndon B. Johnson Library.
- New Haven, Connecticut—July 24-September 5, Yale University Art Gallery.
- Philadelphia, Pennsylvania—April 2-May 15, 1977, The Philadelphia Museum of Art.

For information on bringing an exhibition to your community, write: Smithsonian Institution Traveling Exhibition Service, Washington, D.C. 20560.

Smithsonian Commons

The Commons is now open on weekends for Associates and their families, offering a buffet luncheon for $3.25, with a reduced rate for children. Beverages and desserts are optional. Hours are 11:15 A.M. to 2:15 P.M. seven days a week.

IF YOU LIKE JACK DANIEL'S, you'll enjoy these old posters and signs from Herb Fanning.

Herb runs the general store right here in Lynchburg. So we're letting him sell some old tin signs reproduced from Mr. Jack Daniel's day. There's an advertising thermometer dating to 1894, a bar sign from the 1904 World's Fair, some turn-of-the-century posters, and a host of other things originally turned out by Mr. Jack. Of course, turning out advertising signs was only a sideline for our founder. You can find a better sample of his art wherever you buy whiskey.

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By Patrick Ryan

Postmen can blame it on Old Horsley

As the Christmas card avalanche overflows all horizontal surfaces in the household, spare a thought of seasonal compassion for John Calcott Horsley, British artist who designed the first such greeting card in 1843 (above). He produced it at the initiative of Sir Henry Cole, an eminent Victorian educationist, who probably found himself too busy at the time to follow the custom of writing letters to favored friends and obligatory relatives in social celebration of the winter solstice.

Horsley's design was centered around a convivial family gathering in which everyone from tots to grandpa was benevolently engaged in drinking the health of absent loved ones. He was later castigated by temperance organizations for giving Yuletide encouragement to the spread of insobriety, alcoholism and wild wassail. Such puritanical attacks hit poor old Horsley where it hurt, because he was a fanatical moralist in his own field and campaigned so vigorously against the use by artists of nude models that he earned himself the nickname of Clothes-Horsley.

One thousand copies of that first card were printed and colored by hand, to convey the compliments of the season, and thus provided the total mailing of festive cards in December 1843. It was estimated recently that the average American family sends out 68 cards.

Such immense but short-lived outbursts of mass communication now abruptly swell the postal traffic in the United States alone to some 9.3 billion items during the pre-Christmas period, twice the volume handled during normal months. The international prevalence of this Yuletide postal eruption is exemplified by the necessity in the British Post Office to augment its regular force of 95,000 postal workers with some 130,000 temporary helpers for the Christmas rush.

Most people seem to harbor genuine affection for their mailman, but few send love letters to his boss. Try not to withhold a kind thought for the latter; in such stoniness of heart you may be ungracious to the memories of noble Americans. Among the famous who have labored in the postal service are numbered Benjamin Franklin, Abraham Lincoln, Harry S. Truman and William Faulkner. When Lincoln was postmaster at New Salem, Illinois, in 1833, and customers failed to collect their letters from his office, he delivered them himself.

And in so making his rounds, he usually carried the mail in his hat. Which went to prove, as Lincoln later so ably demonstrated, that at least he had a head for letters. William Faulkner must hold a special place in the secret hearts of all postmasters who spend long years of public service keeping their lips politely buttoned while customers unreasonably blow their tops. When the Nobel prizewinner was postmaster at the University of Mississippi, he would neither interrupt his reading to serve anybody who came to his counter, nor even bother to open up the mounting sacks of incoming mail, on the proud personal ground that he "didn't intend to be beholden to every son of a bitch who had two cents to buy a stamp."

Recorded opinions about the post office by other literary figures are somewhat varied. Voltaire proclaimed that "Those who are absent by its means become present; it is the consolation of life." Thoreau came out in direct opposition to Voltaire: "For my part, I could easily do without the Post Office. . . . I never received more than two or three letters in my life that were worth the postage."

Herodotus earlier did his historical bit in compliment to the Persian letter-carriers of 5 B.C., and if only we hadn't hubristically inscribed his paean of praise on the facade of the New York Post Office, innumerable postmasters would have been spared listening to customers inquiring if it was snow, rain, heat or gloom of night that stayed their local courier from his appointed round?

Such complainers tend to be more forgiving at Christmas—unless one is equipped with the misanthropic hide of the unreformed Ebenezer Scrooge. Whose mention points up a diverting coincidence-in-time: for Charles Dickens published the first edition of *A Christmas Carol* in December 1843, just as Sir Henry Cole was making his inaugural offering of 1,000 Christmas cards. Had Dickens known of this new form of Christmas postal celebration, Scrooge, in the final Stave V, not only would have sent the boy off to buy the prize turkey, but also would have ordered 1,001 of the newfangled cards as well. All to be inscribed with Tiny Tim's closing sentiment, "God Bless Us Every One," and a Merry Christmas to all readers and their postmasters.

Editor's note: Patrick Ryan is retiring —amicably—at the end of this year from a career in the British postal service.

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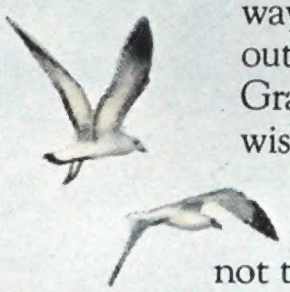

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